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ABSTRACT

This report reviews five current research projects in aesthetic education. Chapter 2 describes recent studies at the Institute of Personality Assessment and Research (IPAR) which relate aesthetics and creativity. Chapter 3 reviews measures of perceptual and cognitive performance; perceptual and aesthetic preference; and aesthetic interests, values, sensibility, and personal philosophy as they relate to creativity. Chapter 4 analyzes the relative contribution of heredity and environment in the development of aesthetic abilities. Chapter 5 provides an historical and conceptual review of aesthetic education in the United States, as well as a description of the specific programs of aesthetic education with which this research was involved. Chapter 6 evaluates student potential for success in such programs, based on measurement, statistical prediction, student interviews, and clinical observation. Chapter 7 makes recommendations, based on the research projects, in the areas of pedagogy, student selection, student and program evaluation, and future research. (Author/DE)

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FINAL REPORT

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Basic Research in Esthetic Education

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Table of Contents

	<i>Page</i>
I. Guide to this Report and Review of Activities	1
II. Studies of Creativity at the Institute of Personality Assessment and Research	6
III. Review of Relevant Measures from IPAR Creativity Studies.	19
IV. Influence of History upon Factors in Creativity and Aesthetic Preference, Judgment, and Expression, as Estimated from Studies using the Twin Method.	31
V. Aesthetic Education: Historical Background and Research in a Variety of Settings.	52
VI. Prediction of Student Performance at the San Francisco Art Institute.	106
VII. Recommendations	117

I. Guide to this Report and Review of Activities

This final report represents the work of the entire staff of the research project, which has encompassed some dozen separate activities and projects. The principal investigator, Dr. Frank Barron, is responsible for this integration of the work of his collaborators. In many instances the original report by a staff member is included in virtually the form in which it was originally written; in other cases the principal investigator has undertaken to rewrite the report to make it consistent in style and format with the whole. Care has been taken to make proper ascription of credits and references to published work where appropriate.

Some individual segments of the reported data lend themselves best to inclusion as appendices rather than in the running main body of this report. This is particularly true of certain (though not all) statistical tables, but it is true also of various documents, reprints, and in particular a book, *Artists in the Making* (Barron, 1972). *Artists in the Making* consists in large part of earlier reports on this research, co-authored by the staff of the project under the direction and editorship of the principal investigator. In addition, we have prepared an audio report on tape which includes selected interviews with student artists and others, and this too may be considered an appendix.

The staff members who have contributed to this total body of work include, in addition to the principal investigator, the following: Drs. Donald W. MacKinnon, Emeritus Professor of Psychology, University of California, Berkeley, who was director of the Institute of Personality Assessment and Research (IPAR) when this research program was initiated there and who wrote Part II of this report; Wallace B. Hall, Acting Associate Director of the Institute, who had primary responsibility for the testing program at the San Francisco Art Institute; Paolo Parisi, director of the Anthropological Labora-

tory of the Mendel Institute, Rome, Italy, and acting editor of *Acta Geneticae Medicae et Gemellologia*; Robert H. Knapp, chairman of the Psychology Department of Wesleyan University; Joseph R. Juhasz, visiting Associate Professor of Psychology, University of California, Santa Cruz; Rosslyn Gaines, Associate Professor of Psychology, Neuropsychiatric Institute, University of California, Los Angeles; Stephen M. Dobbs, Assistant Professor of Education, California State University at San Francisco. The professional staff has also included these individuals holding the Master of Arts degree or its equivalent graduate school credit towards the Ph.D.: Erik Bauersfeld, Isabel Conti, James Dwyer, Diane Denmar, Jerrell Kraus, Donal F. Forrester, Susan Hopkin, Patricia Langford, Deborah Lee, Cynthia Marlowe and Shelley Minnick. Numerous clerical workers contributed to the project under the supervision of the project secretary and chief clerical administrator, Jane Wachsmuth.

The educational settings for the research program have been as follows: The International Child Art Center, San Francisco; the Art in the Park program of the Berkeley Community Center; Vallecito Elementary School, Lafayette, California; College V, University of California, Santa Cruz; and the San Francisco Art Institute. Of these, the major study is the large-scale testing and follow-up study conducted over a period of four years at the San Francisco Art Institute. The research settings have been the Institute of Personality Assessment and Research, College V, and the Mendel Institute.

The following articles or chapters in books, devoted in whole or in part to the report of results from the research, have already been published or are in press as indicated:

Chapters in *Artists in the Making*, Seminar Press, New York, 1972.

Martin, Fred, The school and its students. Introduction, pp. 1-8.

Barron, F., Kraus, J., Conti, I. Talks with students at the San Francisco Art Institute, Chapter 1, pp. 9-19.

00006

- Barron, F., Kraus, J. and Conti, I. Six highly regarded students in interview. Chapter 2, pp. 20-32.
- Barron, F., Kraus, J., Conti, I. and Marlowe, C. Sex differences in self-definition and motivation. Chapter 3, pp. 33-39.
- Barron, F. and Hall, W.B. A psychometric portrait of the student artist. Chapter 4, pp. 40-50.
- Barron, F. and Hall, W.B. Comparative performances of the San Francisco Art Institute students on tests. Chapter 5, pp. 52-62.
- Barron, F. and Knapp, R.H. Correlates of forms of expression in the visual arts. Chapter 6, pp. 63-74.
- Barron, F. Twin resemblances in creative thinking and aesthetic judgment. Chapter 12, pp. 174-181.
- Barron, F. A college for aesthetic education. Chapter 13, pp. 182-188.
- Barron, F. Tables and lists of variables from San Francisco Art Institute testing. Appendix, pp. 189-277.
- Barron, F. The heritability of factors in aesthetic judgment and creativity. *Acta Geneticae Medicae et Gemellologiae*. Spring, 1970, pp. 294-298.
- Barron, F. The creative personality: akin to madness? *Psychology Today*, July, 1972, pp. 43-44, 84-85.

In press:

- Barron, F. Creativity and personal philosophy: their relationship to intense aesthetic sensibility. In Taylor, I. and Getzels, J. *A Quarter-Century of Creativity Research*. To be published by Appleton Century-Crofts, 1974.
- Barron, F. Aspects of form. *Journal of Personality Assessment*.
- Barron, F., Gaines, R., Lee, D. and Marlowe, C. Problems and hazards in the use of rating schemes to describe visual art. *Perceptual and Motor Skills*.

In addition, it is expected that previously unpublished material in the present report (such as the most recent twin study and several newly completed prediction studies at the San Francisco Art Institute and College V) will be submitted for publication soon.

Also, some dozen papers dealing with the research have been presented at meetings of professional societies both in the United States and abroad, including the American Psychological Association meetings in Washington (1971), Honolulu (1972), Montreal (1973), the California Psychological Association (1970), National Educational Research Association in New Orleans (1973), the first International Symposium on Twin Studies in Rome (1969), Western Psychological Association (1970), the International Association of Empirical Aesthetics in Glasgow (1971), the International Congress of Applied Psychology in Liege (1971). The principal investigator served as program chairman of Division 10 (Psychology and the Arts) of the American Psychological Association in 1971 and as President of the Division in 1972. Still another visiting staff member, Dr. Robert H. Knapp, devoted his Invited Address at the A.P.A. meetings of 1971 to work completed on this project.

Other relevant activities of the principal investigator during the period of the research included: 1) serving as a forum member on Creativity in Education forum of the White House Conference on Children; 2) serving on the national advisory board of the Aesthetic Education project of CEMREL (Central Midwestern Regional Educational Laboratory, Inc.); acting as consultant to J. D. Rockefeller 3rd Fund, the World of the Living Arts program in the public school system of Dayton, Ohio, and the Aptos High School innovative program in aesthetics; 4) serving as chairman of the faculty of College V (College for Aesthetic Education) at the University of California, Santa Cruz and chairman of a faculty committee charged with developing an Aesthetic Studies Major for the college; 5) acting as co-director of the Heim's Fund for Creative Children; and 6) serving as an advisory editor for the *Journal of Aesthetic Education*.

This report will take up in turn the major goals of the research. These include: 1) a synthesis of research at IPAR relating aesthetics to

creativity; 2) a review of measures of perceptual and cognitive performance, perceptual and aesthetic preference, and aesthetic interests, values, sensibility, and personal philosophy as they relate to creativity; 3) an analysis of the issue of the relative contribution of heredity and environment to abilities and interests important in aesthetic education and of use of the twin method as a basis of estimation; 4) an historical and conceptual review of aesthetic education in the United States, as well as a description of the specific programs of aesthetic education with which this research was involved, either in evaluation or development; and 5) evaluation of student potential for success in such programs, based on measurement and statistical prediction as well as interview and clinical observation.

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II. Studies of Creativity at the Institute of Personality Assessment and Research¹

The Institute of Personality Assessment and Research (IPAR) was established on the Berkeley campus of the University of California in 1949 with the specific goal of studying effective personal functioning. From the outset, the research concentrated on personal creativity and its various facets, such as originality, imagination, and aesthetic sensibility. Certain ideas about the role of creativity in personal effectiveness and success were formulated by Barron in 1950 as follows:

In addition to these personal characteristics, the successful person will be original and creative. This will show itself in a greater tolerance for unusual ideas and formulations in his field, and will generally issue in original and constructive work. The original person will be facile in perceiving equivalences in the patterning of experience. This feeling for metaphor may lead to a reconstruction of experience in a novel fashion: invention, in the broader sense of that term. The original person is at home to asymmetry, or even positively prefers it to symmetry. It is often the unfinished, the implicit, the connoted and the suggested, which have the greatest charm for him. He has independence of judgment and freedom of perception, so that he need not resort to stereotypes nor depend upon conventional categories. He can tolerate ambiguities and perplexities, and is able to settle for probability rather than certainty. In spite of being quite open-minded and tolerant in some respects, however, he may be rather judgmental in others. If his idea immediately recommends itself to his own sense of reality or beauty, he may persevere in it and adhere to it in a relatively inflexible manner--he is certain, then, of his own rightness.

What is referred to here as originality is, perhaps, better spoken of as generativity or constructiveness. It involves *adding something of one's own* to the elements of experience, making a new pattern which would not otherwise have come into being. This may show itself not only in artistic or scientific creation, but in more general patterns of living and in all sorts of personal interactions, from a casual conversation to an international conference. Thus seen, it is closely related to what might be called sensitiveness, ethical, emotional and esthetic [1950, pp. 5-6].

One of the earliest studies undertaken at the Institute was an attempt to measure qualities of flexible leadership in military officers. A large

¹ These were under the general direction of Donald W. MacKinnon, and the main body of Part II is condensed from his chapter in the forthcoming book, already cited, *Twenty-five Years of Creativity Research*, edited by I. Taylor and J. Getzels.

battery of tests of originality was administered. Among these, eight measures were combined by Barron (1955) to yield a composite score of originality for each subject. Prior to examining the personality correlates of this composite measure of originality, he formulated five major hypotheses concerning the differences between subjects who are regularly original and those who are not.

The five hypotheses, confirmed in this study, were that "original persons: 1) prefer complexity and some degree of apparent imbalance in phenomena, 2) are more complex psychodynamically and have greater personal scope, 3) are independent in their judgments, 4) are more self-assertive and dominant, and 5) reject suppression as a mechanism for control of impulse [Barron 1955, pp. 482-482]."

In this study, Barron also developed a 49-item inventory scale to measure the disposition toward originality in verbal expression or *Verbal Originality* (O-B) (Barron, 1965).

In the same sample of Air Force officers, Barron (1957) was able to study the variables of personality associated with originality when intelligence was partialled out. They were a disposition toward integration of diverse stimuli; energy, fluent output and involvement; personal dominance and self-assertion; responsiveness to impulse and emotion; expressed femininity of interests; and general effectiveness of performance. He also identified two contrasting groups, one high on originality, and discovered that they described themselves quite differently on the ACL. Those high on originality but low on intelligence described themselves as: affected, aggressive, demanding, dependent, dominant, forceful, impatient, initiative, outspoken, sarcastic, strong, suggestible. Those high on intelligence but low on originality saw themselves as: mild, optimistic, pleasant, quiet,

unselfish. Contrasting these self-descriptions with the generally favorable staff descriptions of subjects who were both original and intelligent, he hypothesized

. . . that intelligence represents the operation of the reality principle in behavior, and is responsible for such characteristics as the appropriate delay of impulse expression and the effective organization of instinctual energy for the attainment of goals in the world as it is. To use another of the distinctions proposed by Freud in his theory of the mental apparatus, primary process thinking to the exclusion of the secondary process thinking which carries ego-control to the point where the ego is not so much strong as muscle-bound marks the intelligent but unoriginal person, and easy accessibility of both primary process and secondary process marks the person who is both original and intelligent [Barron, 1957, p. 739].

He was then led to speculate that in the effectively original person there may be "an ability to regress very far *for the moment* while being able quite rapidly to return to a high degree of rationality, bringing with him the fruits of his regression to primitive and fantastic modes of thought (a variant of the phenomenon termed 'regression in the service of the ego' by Lowenstein and Kris) [Barron, 1957, p. 739]."

The Creative Person

The IPAR staff began its researches on creativity with the assumption that there are different kinds of creativity: artistic creativity in which products are clearly expressions of the creator's inner states, his needs, perceptions, motivations, and the like; scientific and technological creativity in which operations are performed on some aspect of the environment which results in novel and appropriate products but to which the worker adds little of himself or of his style as a person, although this description is more appropriate for technological and inventive activity than for more theoretical scientific work; and hybrid forms of creativity such as architecture in which the creative products are both an expression of the archi-

fect and thus a personal statement and at the same time an impersonal meeting of the demands of an external problem. If workers in each of these domains were studied it would be possible to say something about the characteristics of creative persons across several fields of endeavor and also to delineate the ways in which creative persons in one field are different from creative persons in other areas; and, sampling widely in each of the fields, to discover what distinguishes creative persons in any field from those who are relatively uncreative. As representative of artistic creativity a study was made of novelists, poets, and essayists; as representative of scientific and technological creativity research scientists, engineers, and inventors; and as representative of creativity that is at once artistic and scientific, mathematicians and architects.

We at IPAR assumed that creative persons would be intelligent and often highly so, and found that they indeed are (Barron, 1965; MacKinnon and Hall, 1972). But we assumed also, that intelligence alone would not make for creativity. Intelligence as measured by an intelligence test, we had already learned, must be distinguished from the effectiveness with which a person uses whatever intelligence he has. The effective use of intelligence, we hypothesized, depends in large measure upon the mechanism of defense which an individual employs, and more specifically upon his eschewing the mechanisms of repression and suppression; and this also was confirmed (MacKinnon, 1962; Barron, 1965). The effective use of intelligence, and especially its creative use, we assumed would be related to traits of personality, to attitudinal and motivational variables, to cognitive styles, interests, values, etc., in clearly specifiable ways.

In view of the often asserted closeness of genius and insanity and our own earlier finding that originality was not positively related to personal

soundness, we assumed that creative persons might have somewhat more psychopathology but also would be characterized by higher ego-strength (Barron, 1953a) than those less creative and ^{we} sought to test this hypothesis with the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway and McKinley, 1945) and with life-history interviews. Psychopathology was found in creative persons but also evidence of ego strength, and the courage to be open to experience, especially of the inner life.

The finding that creative men earn high scores on the *Mf* (interest) scale of the MMPI confirmed our expectation, derived from the writings of Jung (1928), that they would give a more integrated expression to the feminine side of their nature than less creative men. And this along with other findings tended to confirm a broader hypothesis about creative persons, one also derived from Jungian theory, namely, that creative persons would show more reconciliation of the opposites of their nature than would less creative persons.

Assuming that creatives would differ from non-creatives in their preference for the opposed attitudes and psychological functions conceptualized by Jung (1923), we administered the Myers-Briggs Type Indicator (Myers, 1962). Our assumption that creatives would tend to be introverted and to show a preference for intuition over sensation, and for perception over judgment was confirmed. We were less clear as to whether thinking or feeling would be preferred by our creative subjects. Actually a preference for thinking or for feeling turned out not to be related to creativity but to the type of materials or concepts with which the creative person deals: writers prefer feeling; mathematicians, research scientists, and engineers prefer thinking; architects split fifty-fifty in their preference for one or the other of these two functions.

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Building upon Barron's earlier work with aesthetic preference, it seemed likely that creative subjects would show a perceptual preference for the complex and asymmetrical, and they did. Building upon Crutchfield's (1951, 1955) and Barron's (1953b) studies of independence of judgment it was hypothesized that creative persons would show considerable independence and need for autonomy, and on several measures of these traits they scored high.

It seemed likely that creative persons in the fields chosen for study would show a distinctive pattern of interests as had graduate students (Gough, 1953) and military officers (MacKinnon et al, 1958) who had scored high on originality. With only slight variation from group to group, creative persons have shown interests similar to those of psychologists, author-journalists, lawyers, architects, artists, and musicians, and unlike those of purchasing agents, office men, bankers, farmers, carpenters, veterinarians, policemen, and morticians. We have interpreted such a pattern of interest to mean that "creative persons are relatively uninterested in small details or in facts for their own sake, and more concerned with their meanings and implications, possessed of considerable cognitive flexibility, verbally skillful, interested in communicating with others and accurate in so doing, intellectually curious, and relatively disinterested in policing either their own impulses and images or those of others [MacKinnon, 1962, p. 490]."

It also seemed likely that creative persons would have a distinctive pattern of the values conceptualized by Spranger (1928) and measured by the Allport-Vernon-Lindzey Study of Values (1951). Theoretical and aesthetic values are most highly prized by the creative persons in our studies. Among creative research scientists the theoretical value is highest with the aesthetic value almost as high, among creative architects the order is reversed,

and among creative mathematicians the two values are high and approximately equally strong.

Despite our expectation of some psychopathology in our creative subjects, in our theorizing we favored the view that "creative expression is an integral facet of the personality . . . the highest and most distinctive manifestation of it [Gough, 1964, 5-6]." Accordingly we assumed that creative persons would reveal a favorable profile of traits on the California Psychological Inventory (Gough, 1957a), an instrument designed to tap and to measure the more positive aspects of personality. Across samples, they tended to do just that.

Our hypothesis that creativeness is more an expression of health than of disease, a manifestation of the person at his best, receives some support in our study of architects from our finding that multiple regression equations limited to three scales from each of seven personality inventories yielded significant cross-validated correlations with ratings of creativity for inventories measuring the more favorable aspects of personality but not for the MMPI which measures psychopathology. Specific cross-validated coefficients were as follows: SVIB, .55; CPI, .47; MBTI, .42; ACL, .38; Study of Values, .38; and MMPI, .20⁶ (Hall and MacKinnon, 1969).

We assumed that the staff's perceptions of the more creative subjects would differ from its perceptions of those less creative. Three techniques for recording staff impressions of our subjects were employed: the ACL, the Q-sort method (Block, 1961), and trait ratings. As predicted, creative persons were seen as quite different from relatively uncreative persons (e.g., Barron, 1965; MacKinnon, 1967).

In general and across samples the more creative persons were seen as ingenious, imaginative, courageous, original, artistic, clear-thinking, insightful, interests wide, versatile, intelligent, individualistic, preoccupied,

complicated. Adjectives more often used to describe the less creative persons were appreciative, considerate, conventional, obliging, sympathetic, lazy, easy-going, shy, dull, inhibited, weak.

A similar picture of creative persons is seen in the staff's composite Q-sort description of them. In three samples, for example, the following items received Q-sort values of either 9 or 8 on a 9-point scale:

Thinks and associates to ideas in unusual ways; has unconventional thought processes.

Is an interesting, arresting person.

Genuinely values intellectual and cognitive matters.

Appears to have a high degree of intellectual capacity.

In addition, there were of course, differences in placement of Q-sort items for the several samples, most of which make good sense (Barron, 1965).

Attributes which we assumed would, in general, bear some relation to creativity can be gleaned from an examination of the traits which we undertook to rate for each subject after the assessment weekend and without knowledge, it goes without saying, of his creativeness as judged by the experts. There was some slight variation in the lists of traits rated for each sample, but the one used with creative architects is typical. The trait ratings significantly correlated with rated creativity were: Originality .61, Aesthetic sensitivity .53, Sense of destiny .53, Ideational responsiveness .45, Cognitive flexibility .44, Inquiringness as a habit of mind .44, Independence .44, Sense of personal identity .43, Intellectual competence .40, Cathexis of intellectual activity .38, Critical judgment .37, Social acuity .31.⁷ Trait ratings not significantly related to the criterion in this sample were: Dominance .22, Behavioral output .28, Breadth of interests .28, Likeability .22, Personal soundness .17, Impulsivity .17, Responsibility .13, Warmth .07, Masculinity -.10, Rigidity -.22 (MacKinnon, 1967).

Despite wide diversity, the biographies of our creative subjects revealed several recurrent themes. There was in most cases an early development of interest in and sensitive awareness of inner experiences. Complex unstereotyped symbolic activity in childhood was characteristic. Acute loneliness in childhood was a commonly reported experience, whether due to sickness, a lack of siblings or companions, or a natural shyness. Other frequently occurring biographical themes were: the possession of special skills and abilities which the child enjoyed exercising and the expression of which was encouraged and rewarded by one parent or the other or some other adult; aesthetic and intellectual interests of one or both parents similar to those of the child; an unusual freedom for the child in making his own decisions and exploring his universe, whether granted by the parents or asserted and demanded by the child; an early and unusual amount of independence both in thought and action; a lack of intense closeness between parent and child so that neither overdependence was demanded nor a feeling of rejection experienced; a lack of anxious concern for the child on the part of the parents; the presence of effective adults of both sexes, not necessarily the father or mother, with whom identification could be made and who offered effective models for the development of ego-ideals; frequent moving during the early years, often from abroad to this country, providing both personal and cultural enrichment for the child; and freedom from pressures to establish prematurely a professional identity.

The present research grew out of the early interest at IPAR in esthetic sensitivity and the demonstration of its relation to creativity. Questions around which the new research was organized were: 1) the interrelationships among such factors as aesthetic sensitivity, aesthetic judgment, acuity of visual perception, valuation of the aesthetic, and talent for aesthetic

expression; 2) the heritability of factors in creativity and aesthetic sensibility; 3) developmental sequences and sex differences in the nature and use of these capacities; 4) influence of special educational programs upon them; and 5) the role of personality traits and motives in shaping aesthetic creativeness and responsiveness. Most of the results of the research have been presented in several papers and in the book, *Artists in the Making* (Barron, 1972). Further results will be given and discussed in the present report.

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III. Review of Correlates of Relevant Measures from IPAR Creativity Studies

As MacKinnon points out in the preceding section, the IPAR criterion measures that were based on ratings of creativity in high-level professional groups such as architects, scientists, and mathematicians could be predicted with considerable success through the application of regression equations based on the total battery of tests employed. It is noteworthy, however, that measures of cognition and perceptual performance, as distinct from interests, preferences, and values, did not appear in any of the prediction equations. In this section of the report, we shall look at this finding in more detail. The discussion that follows is based upon the correlational picture given in Table III.1 through Table III.5. The variables selected for analysis in these various domains included all theoretically relevant (aesthetic abilities and interests) tests in the IPAR assessments: 1) the Concept Mastery Test, a high-level verbal intelligence test developed by Louis M. Terman and his associates in the California Gifted Children project at Stanford University to provide differential measurement of adult intelligence in the high I.Q. range; 2) the Arthur Stencil Design Test; 3) the Gestalt Transformation Test developed by J. P. Guilford; 4) the Bennett Idea Classification Test; 5) the Kent-Rosanoff Word Association Test; 6) a series of perceptual cognitive measures developed by R. S. Crutchfield, most of them adaptations of well-known perceptual problems; 7) the Allport-Vernon-Lindzey Scale of Values; 8) several scales of masculinity-femininity, drawn from the Strong Vocational Interest Blank, the Minnesota Multiphasic, and the California Psychological Inventory; 9) the Mosaic Construction Test; 10) the Barron-Welsh Art Scale and the revised Art Scale; 11) verbal questionnaire scales to measure independence of judgment, complexity of outlook, and ori-

ginality. A full list of the selected measures is given below. The numbers assigned to this list are identical with the numbers given for variables in Tables III.1 through III.5.

A. Creative Architects

The criterion of *creativity* consisted of ratings by experts in architecture (MacKinnon, 1962), and the group designated "creative" included 40 of the 66 leading American architects in terms of creativity rated by the panel of expert judges.

Of 51 variables (out of a possible 56) selected as relevant to aesthetic sensibility, only one bore a significant relationship to the criterion. *Femininity* as measured by the California Psychological Inventory is that variable, and the correlation is .34.

Originality as rated by the IPAR assessment staff fared little better. The significant correlation with CPI *Femininity* drops to an insignificant .12. Three variables have a significant positive correlation: Theoretical Values on the Allport-Vernon-Lindzey Scale of Values. (.36); a score consisting of the sum of five subscales of the cpi designed to measure aspects of Originality (.35); and the Barron Complexity Scale, an inventory measure developed from the IPAR item pool and scored in part on the CPI (.34).

B. Representative Architects

Two other groups of architects were studied for purposes of comparison with the group designated as creative. Architects II (N=43) were associates of the creative architects, while Architects III (N=41) were chosen at random. These comparison groups were given some tests by mail but were not seen by the assessment staff and hence were not rated for *Originality*. They were, however, rated for *Creativity* by the expert judges.

For Architects III, two of the 28 test variables showed a significant correlation with *Creativity*. One variable is Economic Values on the AVL

Scale of Values (-.39). For Architects II, the same variable shows a similar negative value (-.36). For creative architects, however, the correlation, though insignificant, was in the reverse direction (.25).

The second significant correlation with *Creativity* in Architects III is the Author-journalist Scale of the Strong Vocational Interest Blank (.34). However, this scale correlates only .16 with *Creativity* in Architects II, and shows a negative value (-.12) in the group designated as creative.

Finally, in Architects II there are several other significant correlations which do not appear in Architects I or Architects III. These are: Independence of Judgment .44; SVIB: Psychologist .43; Originality .33; the perceptual attitude (Scale P) as measured by the Myers-Briggs Jungian Type Indicator .34; and SVIB: Artist .33.

Overall, a total of 107 correlations computed between these selected variables and rated creativity in the three groups of architects produced 10 correlations significant at the .05 level. A total of 56 correlations with *Originality* as rated by psychologists on the basis of three days of assessment observation produced 3 correlations significant at the .05 level.

Although the findings are sparse and could be dismissed as chance when one evaluates the set *qua* set of correlations for significance, some trends are worth noting. Measures of cognitive and aesthetic performance wash out completely, including verbal intelligence measures, mechanical comprehension, and non-verbal intelligence. This finding is quite striking. The variables that look promising are inventory measures, particularly the Strong Vocational Interest Blank, the Allport-Vernon-Lindzey Scale of Values, and the item pool represented by the California Psychological Inventory and various scales devised piece-meal by Barron, including Independence of Judgment, Originality, and Complexity, all of which are included in the Barron Inventory of Personal

Philosophy.

It might be added that the Gullford creativity test battery had been included in the architect study and was earlier reported (MacKinnon 1962) to show no significant correlations with rated creativity or originality in the creative architect group.

C. Research Scientists

These 45 research scientists were a high-level professional group employed in industry, primarily in the field of electronics. Each was rated for job performance, in terms of creativity, by his supervisors. The scientists also were assessed at IPAR and all were rated for *Originality* by the psychological staff.

Two of the 56 variables show a significant correlation with *Creativity*: the Barron-Welsh Art Scale (.39), and a slight revision of it called the Revised Art Scale (.40). These latter two scales are so highly correlated (.95) that they should be considered as a single variable, however.

Psychological staff ratings of *Originality* produce a great many more significant correlations, however. They are as follows: SVIB Masculinity -.43; MMPI Femininity .34; AVL Economic Values -.45; AVL Aesthetic .39; AVL Social .50; AVL Political -.29; AVL deviance from the norm .30; Mosaic Construction "Good Use of Form" .36; Barron-Welsh Art Scale .43; Revised Art Scale .41; Concept Mastery Test total score .33; Concept Mastery Test analogies subscale .37; SVIB: Artist .33; Psychologist .45; Author-journalist .36; Musician .39; Specialization Level .30.

Again, *all* the visual discrimination or problem-solving tests wash out, though verbal intelligence and aesthetic judgment and one aspect of performance (good use of form) emerge as significant. The inventory scales again seem to hold most promise, particularly the Strong Vocational Interest Blank

and the Allport-Vernon-Lindzey Scale of Values.

D. Mathematicians

This sample consisted of 55 mathematicians, most of them associated at one time or another with the Institute for Advanced Study (at Princeton) as Fellows. They were rated for creativity by a panel of mathematicians familiar with their work. A subgroup of 12 mathematicians was given the visual discrimination and performance tests by R. S. Crutchfield; the rest were tested by mail, using all the other tests that did not require individual administration.

Two variables produce significant correlations with the criterion of creativity: SVIB: Author-journalist (.38) and SVIB: Musician (.31). For the individually administered tests *all* correlations with the criterion of creativity were negative, including a non-significant correlation of $-.41$ with verbal intelligence.

E. Creative Writers

This sample consisted of 48 creative writers, 21 of whom were studied by the full 3-day living-in assessment procedure, while the other 26 were administered tests by mail. This was the first creative group studied at IPAR, and many tests added to the assessment battery for later groups were not used in the study of writers. The mail-out was limited to the Barron-Welsh Art Scale, the California Psychological Inventory, and the Myers-Briggs Type Indicator. The various Crutchfield measures were omitted from the living-in assessment, as was the Strong Vocational Interest Blank and the Allport-Vernon-Lindzey Scale of Values. Thus, a very limited subset of the selected variables is available for scrutiny on this sample, consisting of only 9 measures for the larger N and 18 for the smaller, living-in assessment sample.

The external criterion consisted of ratings of creativity by five dis-

tinguished literary critics. As usual, Originality was rated by the IPAR staff on the basis of social observations during the 3-day assessment and without knowledge of test results.

Three of the nine variables measured on the larger group (N of 47) proved to correlate significantly with the critics' ratings. These were: The Barron Independence of Judgment scale, .53; the Barron Complexity of Outlook scale, .48; and the Barron Originality scale of the CPI, .31. For the smaller groups (N or 21), there were no significant correlations. Since the relationship of creativity to measured intelligence is of special interest, it is worth noting that the correlation is .09, rather similar to what we have generally found in these studies. That topic and the other findings are discussed in detail in *Creative Person and Creative Process* (Barron, 1969).

Turning now to the IPAR staff rating of Originality, we note once again that measured intelligence does not bear a significant relationship to it. The correlation with the Concept Mastery Test is in fact negative: -.10. Also negative, but significantly so, is the Barron Ego-strength scale (-.35) and a questionnaire developed by Gough to predict professional success (the P-IV scale, which produces a -.44 correlation with rated Originality).

Once again, the overall results are meagre, but they do support the evidence from other studies that attitudinal and motivational variables are the only ones that predict creative achievement.

Discussion

It should be noted at the outset that the set of variables here under discussion were chosen as measures of cognition, aesthetic preferences and values, and personality style and motives putatively relevant to artistic or aesthetic potential. When *all* assessment variables used in the IPAR

studies are taken into account, quite substantial multiple correlations with the criteria have been found, and have held up upon cross-validation, as reported in the preceding summary by MacKinnon.

What we conclude tentatively from this review was that performance measures hold little promise, and that our best bets for future research in aesthetics, if selection is the goal, should be inventories of occupational interests and activities, values, and motivation. Nonetheless, since we had not yet studied artists, it seemed prudent to include in the potential selection test battery several measures of visual abilities, such as the Gottschaldt Figures, and Perceptual Acuity Test, and new measures of aesthetic judgment. Part V of this report will take up the question once again in relation to our most recent findings.

Table III.1
Correlations between Selected Measures, Hypothetically
Related to Artistic Potential, and Rated Creativity
and Originality in Creative Architects (N=40)

Variable Number	Creativity	Originality	:	Variable Number	Creativity	Originality
1	.103	.119	:	27	.236	.005
2	.200	.141	:	28	-.074	.009
3	<u>.338</u>	.120	:	29	-.102	-
4	.035	<u>.360</u>	:	30	.177	.231
5	.240	.204	:	31	-.049	.164
6	-.205	-.114	:	32	.211	<u>.347</u>
7	-.298	-.302	:	33	.163	<u>.342</u>
8	-.015	.021	:	34	-.046	.230
9	.145	-.133	:	35	-.050	.235
10	-.158	.015	:	36	-.022	.208
11	-.068	.036	:	37	.125	.039
12	-	-	:	38	-.095	.093
13	.201	.204	:	39	-.041	.128
14	.012	.017	:	40	-.028	.060
15	-.161	-.240	:	41	.157	.177
16	.105(N=39)	.009	:	42	.303	.282
17	-.170	-.022	:	43	.171	.106
18	.137	.233	:	44	-.136	-.172
19	-.110	-.010	:	45	.045	-.226
20	.196	-.096	:	46	.058	.031
21	.221	.019	:	47	-.038	-.097
22	.176	-.095	:	48	-.214	-.153
23	.138	-.092	:	49	-.055	-.062
24	.259	.102	:	50	-.115	-.025
25	.226	-.006	:	51	-.166	-.205
26	.219	-.029	:	52	-.102	.013

Note: Underlined correlation coefficients are significant at the .05 level or better.

Table III.2

Correlations between Selected Measures, Hypothetically
Related to Artistic Potential, and Rated Creativity
in Representative Architects

No.*	Creativity		:	No.*	Creativity	
	Architects II (N=43)	Architects III (N=41)			Architects II (N=43)	Architects III (N=41)
1	-.256	-.168	:	27	-	-
2	.125	.017	:	28	-.040	-.070
3	-.113	.200	:	29	-.118	-.025
4	.045	-.074	:	30	<u>.333</u>	.030
5	<u>-.356</u>	<u>-.389</u>	:	31	.232	.208
6	.117	.190	:	32	.238	.083
7	.106	.298	:	33	.143	.228
8	-.003	-.128	:	34	-	-
9	.156	.042	:	35	-	-
10	.233	-.054	:	36	-	-
11	<u>-.032</u>	.173	:	37	<u>.441</u>	.136
12	-	-	:	38	.213	.072
13	-	-	:	39	.032	-.258
14	-	-	:	40	-.016	-.058
15	-	-	:	41	<u>.342</u>	.060
16	-	-	:	42	.213	-.061
17	-	-	:	43	-	-
18	-	-	:	44	-	-
19	-	-	:	45	-	-
20	-	-	:	46	-	-
21	-	-	:	47	-	-
22	-	-	:	48	<u>.333</u>	.298
23	-	-	:	49	<u>.430</u>	.256
24	-	-	:	50	.162	<u>.338</u>
25	-	-	:	51	.077	.243
26	-	-	:	52	<u>.342</u>	.045

Note: Underlined correlation coefficients are significant at the 0.5 level or better.

* No. of variable.

00031

Table III.3

Correlations between Selected Measures, Hypothetically
Related to Artistic Potential, and Rated Creativity
and Originality in Research Scientists (N=45)

Variable Number	Creativity	Originality	:	Variable Number	Creativity	Originality
1	-.072	-. <u>.427</u>	:	27	.029	.041
2	.057	. <u>.344</u>	:	28	. <u>.390</u>	. <u>.427</u>
3	-.076	. <u>.142</u>	:	29	. <u>.406</u>	. <u>.408</u>
4	.087	.234	:	30	.097	.158
5	-.165	-. <u>.451</u>	:	31	-.022	.264
6	-.087	. <u>.390</u>	:	32	.092	.161
7	.181	. <u>.501</u>	:	33	.046	.147
8	.006	-. <u>.295</u>	:	34	-.042	. <u>.329</u>
9	.055	-.202	:	35	-.093	.273
10	.014	.047	:	36	.072	. <u>.372</u>
11	.248	. <u>.301</u>	:	37	-.249	.023
12	-	-	:	38	.159	.153
13	-	-	:	39	.214	.147
14	-	-	:	40	.093	.061
15	.227	-.029	:	41	.283	.227
16	-.107	.030	:	42	.266	.271
17	.219	.019	:	43	.045	.187
18	.087	.094	:	44	.208	.060
19	-.077	.037	:	45	.100	.081
20	.055	.204	:	46	-	-
21	.141	.271	:	47	-	-
22	.082	. <u>.358</u>	:	48	.147	. <u>.332</u>
23	.086	.289	:	49	.119	. <u>.449</u>
24	.126	.155	:	50	.169	. <u>.361</u>
25	.157	.272	:	51	.046	. <u>.397</u>
26	.122	.288	:	52	.111	. <u>.295</u>

Note: Underlined correlation coefficients are significant at the .05 level or better.

Table III.4

Correlations between Selected Measures, Hypothetically
Related to Artistic Potential, and Rated Creativity
and Originality in Mathematicians

No.*	Male (N=55) Creativity	Female (N=40) Creat.	Orig.	:	No.*	Male (N=55) Creativity	Female (N=40) Creat.	Orig.
1	-.222	.221	.142	:	27	.453	-.033	.062
2	.255	-.322	-.304	:	28	.025	.062	.039
3	.119	.243	-.015	:	29	.248	.030	.023
4	.119	.078	.071	:	30	.091	.234	.382
5	.079	-.290	-.490	:	31	-.065	.283	.190
6	.237	.286	.293	:	32	.156	.186	.397
7	-.149	.175	.077	:	33	.045	.209	.221
8	.079	-.059	.035	:	34	-.409	.315	.297
9	-.230	-.163	-.011	:	35	-.378	.320	.293
10	.244	.270	.393	:	36	-.410	.263	.265
11	.164	.309	.161	:	37	.015	.236	.148
12	-	-.031	.075	:	38	-.024	.048	.010
13	-.309	.037	-.124	:	39	.077	-.104	.176
14	-.265	-.277	.052	:	40	.015	.088	.154
15	-.236	.169	.026	:	41	.149	.287	.252
16	-.161	.045	-.122	:	42	.100	.247	.273
17	.188	.165	.072	:	43	-	.221	.089
18	-.410	-.283	-.409	:	44	-	-	-
19	-.043	-.079	-.043	:	45	.022	.108	.137
20	-.223	.100	.125	:	46	-.458	.292	.274
21	-.344	.190	.293	:	47	-.172	-.194	-.142
22	-.120	.085	.177	:	48	.140	.406	.394
23	-.322	.055	.182	:	49	.243	.438	.514
24	-.543	.073	.155	:	50	.384	.432	.491
25	-.468	.146	.143	:	51	.314	.239	.214
26	-.281	.115	.188	:	52	.013	.030	.269

Note: Underlined correlation coefficients are significant at the .05 level or better.

* No. of variable.

Table III.5

Correlations between Selected Measures, Hypothetically
Related to Artistic Potential, and Rated Creativity
and Originality in Creative Writers

No.*	N	Creativity	Originality	:	No.*	N	Creativity	Originality
1	-	-	-	:	31	48	.104	.067
2	47	-	-	:	32	48	.232	-.041
3	48	-.167	.107	:	33	48	<u>.488</u>	<u>.367</u>
4	-	-	-	:	34	24	.094	-.100
5	-	-	-	:	35	24	.181	-.020
6	-	-	-	:	36	24	-.041	-.206
7	-	-	-	:	37	48	.531	-.149
8	-	-	-	:	38	47	.031	-.352
9	-	-	-	:	39	48	.038	-.438
10	-	-	-	:	40	21	.238	-.218
11	-	-	-	:	41	40	.215	.010
12	-	-	-	:	42	40	.102	.285
13	-	-	-	:	43	-	-	-
14	-	-	-	:	44	-	-	-
15	-	-	-	:	45	23	-.172	-.120
16	-	-	-	:	46	-	-	-
17	-	-	-	:	47	-	-	-
18	-	-	-	:	48	-	-	-
19	-	-	-	:	49	-	-	-
20	21	.063	.105	:	50	-	-	-
21	21	.222	.007	:	51	-	-	-
22	21	.018	.005	:	52	-	-	-
23	21	.054	.044	:	53	26	<u>.732</u>	<u>.631</u>
24	21	.266	.148	:	54	26	.400	<u>1.000</u>
25	21	.037	.027	:	55	26	.301	-.240
26	21	.106	.042	:	56	21	.004	-.309
27	21	.317	.005	:	57	21	.078	-.244
28	37	.266	-.267	:	58	14	-.041	-.270
29	37	.176	-.425	:	59	9	-.421	-.043
30	48	<u>.305</u>	.132	:				

Note: Underlined correlation coefficients are significant at the .05 level or better.

* No. of variable.

00034

IV. Influence of Heredity upon Factors in Creativity and Aesthetic Preference, Judgment, and Expression, as Estimated from Studies Using the Twin Method

The use of human twins to study the relative influence of heredity and environment was first suggested by Francis Galton in 1875 in his paper "The history of twins as a criterion of the relative powers of nature and nurture." He proposed there what has since become the classic design in twin studies: a comparison of the degree of similarity of monozygotic (MZ) vs. dizygotic (DZ) twin partners.

Since MZ twins issue from the fertilization of a single egg and are therefore genetically identical, and DZ twins issue from the fertilization of two eggs and have a probability of identical genes of 0.5 like ordinary siblings, differences in degree of similarity between them can be attributed to genetic influences if there are no differences in environment. Since to a large extent twins who are reared together share the same environment, both before birth and for some time after, their comparative degree of resemblance does provide a measure of genetic influence.

Since the fundamental logic of the twin method is well known, we shall recall here only a few general concepts, without going into detail. The environmental factors which interact with the genotype in the realization of the phenotype may be classified as follows.

1. *progenetic factors*, acting before conception and determining the characteristics of the gametes (e.g., parental age);
2. *paragenetic factors*, acting during pregnancy (maternal environment);
3. *postnatal environmental factors*, acting after birth (sometimes mistakenly referred to as *the environment*).

Clearly, both progenetic and paragenetic factors are much more similar

for twin partners than for simple siblings. In fact, these factors may be considered as practically overlapping in twin partners, and equally so for the MZ's and the DZ's. Postnatal environmental factors, however, may only be considered as approximately similar.

The basic assumption, therefore, is that differences between MZ cotwins may be originated only by postnatal environmental factors, while differences between DZ cotwins may be originated either by postnatal environmental factors or by genetic factors, or both. DZ twins are used as a control, progenetic and paragenetic factors being in them as similar as in the MZ's, which would not apply to simple siblings.

Different methodologies and techniques have been worked out to evaluate, through the study of twins, to what extent a character or condition is inherited. These are, basically, 1) the analysis of correlation; 2) the analysis of variance in MZ vs. DZ series (Newman, Freeman and Holzinger, 1937); and 3) the twin family method (Kallmann, 1946). These three methods are closely related. To their results, either Holzinger's formula (1929), $H = (V_{dz} - V_{mz}) / V_{dz}$, or $h^2 = r_{mz} - r_{dz} / 1 - r_{dz}$, may then be applied in order to evaluate the respective contributions of heredity and environment to the determination of the trait under study. We have applied both these measures as appropriate in our present research.

In spite of well-recognized difficulties, the comparison of large series of monozygotic and dizygotic twin pairs with appropriate methods of observation and analysis has made it possible to estimate the degree of heritability of many human characteristics. The twin method has in fact proved of fundamental importance for the development of human genetics, which for various compelling reasons could have little or no recourse to the experimental methods and techniques used by animal and plant geneticists.

The twin method in human genetics thus in a sense takes advantage of an experiment the first step of which is performed by Nature.

A large mass of information has been collected through widespread application of twin studies to practically every kind of human normal or pathologic traits. In his monumental *Study of Twins*--the most complete analysis of the subject up to that time--Gedda (1951) examined and listed some 12,000 references.

There have been three major applications of the twin method: 1) in the study of general morphology and physiology; 2) in medical genetics; and 3) in behavioral genetics, including psychology and psychiatry.

The morphological and physiological studies have demonstrated a high degree of heritability for such characteristics as: height; weight; all kinds of head, face, and body measurements; dermatoglyphic traits; aging processes in bones and teeth; specific enzymes, such as creatinphosphokinase, leucocyte alkaline phosphatase, eruloplasmin, and cholinesterase; hormones, such as the thyroid hormone; and such measurable physiological characteristics as blood pressure, pulse rate, electrical activity of the brain, the heart, and so on.

The twin method has found an even larger application in general medicine, where it is now accepted as a basic tool for the etiologic as well as clinical study of human pathology. Extensive twin studies have been (and continue to be) carried out for such conditions as cancer, heart diseases and arteriosclerosis, diabetes, stomach ulcers, tuberculosis, congenital heart disease and other congenital malformations of various organs, allergies, infectious diseases, and so on. In most of these pathologies a genetic component has been identified, though of varying degree in each. Leukocyte and tissue typing, which are of basic importance in organ transplantation, are among

the many recent and promising applications of the twin method.

The results in behavioral genetics indicate significant genetic influences in general intelligence and in various specific intellectual factors as well, such as mathematical and verbal aptitudes (Nichols 1965). Various forms of psychopathology such as schizophrenia, manic-depressive psychoses, idiopathic epilepsy, and criminality, also show significantly greater concordance in monozygotic twins than in dizygotic. Even such specific behaviors as smoking tobacco and drinking alcohol reveal this same indicative pattern of resemblance in twins. A summary of these results is provided in The Psychology of Personality (Wiggins et al 1971).

The demonstrated pervasive influence of genetic factors upon intellectual functions and upon behavior make it imperative that we address the question of heritability of relevant factors in aesthetic sensibility and creativity if we are to begin to reckon with the influence of aesthetic education upon such functions. The first study carried to completion in the present research is reported in Artists in the Making and will not be repeated here. Suffice it to note that significant heritabilities were discovered for such measures as the Gottschaldt Figures and the Barron-Welsh Art Scale, and that both MZ and DZ twins showed marked and about equal resemblance in verbal originality. The present study, which even yet is not fully complete, was conducted for the most part in the Spring and Summer of 1972, and the data analysis to be reported was completed in 1973 and has not yet been submitted for journal publication. Our intention is to submit it to Acta Geneticae Medicae et Gemellologiae, probably with Barron, Parisi, and Dwyer as co-authors, although it may prove better to break it into two or even three articles with some other combinations of the authors of the work presented here.

The 1972 Mendel Institute Study

A total of 61 pairs of like-sexed Italian twins, 36 monozygotic and 25 dizygotic, approximately equally divided between male and female pairs, were tested at the Mendel Institute in Rome. The project was under the general direction of Dr. Paolo Parisi of the Mendel Institute, with assistance from Isabel Conti and Kathryn Walker and in collaboration with the principal investigator.

Not all tests were taken by all twins, as Table IV.4 shows. All twin research involving individual administration of many tests on more than one occasion is dogged by the difficulty that twins often fail appointments after the first one, and that frequently only one twin of a pair will show up, thus making the cotwin's data useless. In spite of this, valid data were obtained for from 57 to 61 pairs for the Barron-Welsh Art Scale, the Perceptual Acuity Test, the Gottschaldt Figures, and the Child Esthetic Preference Test. The sample was reduced to 32 pairs for the M-threshold Inkblots and the Gough Adjective Check List, and to 28 pairs for the Franck Drawing Completion Test.

The variables of central interest to this research are of course the perceptual and esthetic preference and expression measures. The Adjective Check List was included as a measure of self-perception that surveys a large number of traits, and which might therefore give leads for future research. Moreover, the twins were asked to go through the 300-item checklist under three different conditions: first, describing themselves; second, describing the cotwin as the cotwin would describe himself; and third, guessing at what adjectives the cotwin would check under condition 2. These latter two conditions were inserted with a view to discovering whether misperception of

twins by one another is related to their zygoty, and hence it is peripheral to our present concerns.

In what follows, we shall consider the Adjective Check List survey first and then go on to an analysis of the perceptual and aesthetic measures.

A previous study of twins that employed an adjective check list was reported by Scarr (1966). The mothers of 28 pairs of DZ twins and 24 pairs of MZ twins were asked to describe each of their twin daughters with this instrument. The 300 adjectives were variously grouped into 19 scales and the heritability of each scale was estimated with Holzinger's H' (Holzinger, 1929). The MZ twins were found to be more similar than DZ twins on 15 of the 19 scales although these differences were statistically significant at the five percent level in only three instances. The scales evidencing the greatest predominance of genetically associated variance were *need-change* and *counseling readiness* while *n-affiliation* evidenced significant heritability as well as a significant environmental component. Scarr (1966) concludes that:

. . . the DZ correlation for ACL *n-affiliation* is significant, but the MZ correlation is extremely high (.83), showing a majority of genetic influence for sociability . . . the high heritability (.66) found for *n-change* may be interpreted as the inheritance of flexibility versus rigidity (p. 356).

These ACL results with twin girls tend to support previous findings with other personality tests. Gottesman (1963) reported a heritability of .60 for his female adolescent twins on the Social Introversion scale of the MMPI. An even greater heritability was found for males (.84). Gottesman (1963) argued that the sex difference may be due to less environmental pressure for sociability in males. These heritability coefficients coincide with that reported by Eysenck (1956) for his introversion-extroversion scale (.61) with a small sample of males and females.

The high heritability of anxiety (counseling readiness) has been found by Eysenck (1951), Slater (1953), Shields (1954), and Gottesman (1963) in twin studies of both sexes. The authors of a methodologically sophisticated re-analysis of data collected during the past two decades (Jinks & Fulker, 1970) concluded that genes account for about two-thirds of the variance in introversion-extroversion.

For the adjective check list portion of the present study, twenty MZ and 12 same-sex DZ twin pairs participated. Complete data were gathered on seven MZ female pairs, 13 MZ male pairs, four DZ female pairs and five DZ male pairs. These 32 pairs were all that could be rounded up (of the original 61 pairs) during the limited time available to complete the study in Rome comprised an unselected sample from the population of Italian twins identified by Dr. Parisi in the Anthropological Laboratory of the Mendel Institute.

The zygosity of the pairs was determined both from birth records and by serological examination with a high level of confidence. The age of the twins ranged from 18 to 25.

Procedure

Each twin was asked to complete an Italian translation of a standard list of 300 adjectives (Gough, 1960). The twins checked the appropriate adjectives under three instructional sets;

- A: Check those adjectives which describe you.
- B: Check those adjectives which you expect your twin to use when he/she describes him/her self.
- C: Check those adjectives which you expect your twin to use when describing you.

This procedure resulted in a set of six ACL profiles or sets of checked adjectives for each twin pair. The six will be identified as A1, B1 and C1 for the arbitrary first twin and A2, and C2 for the second twin.

Overall Similarity

The crux of heritability studies with twins is the attempt to identify those characteristics or dimensions on which MZ twins are more similar than same-sex DZ twins. However, as a first stage of analysis we compared entire ACL profiles to determine whether or not MZ twins' profiles are more similar than those of DZ twins. Since each twin completed the ACL under three separate instructional sets, there are nine unique pairwise comparisons that may be considered: A1-A2; B1-B2; C1-C2; A1-B2 and B1-A2; A1-C2 and C1-A2; B1-C2 and C1-B2; A1-B1 and A2-B2; A1-C1 and A2-C2; B1-C1 and B2-C2. The first six of these comparisons involve an ACL completed by each twin while the last three involve a comparison between two completions of the ACL by the same twin--but under two different instructional sets.

Each of these comparisons requires special interpretation. For example, A1 and A2 are self descriptions while B1 and B2 may be considered observer descriptions of a special kind. Thus, a greater similarity between the A1 and A2 profiles for MZ twins than DZ twins would be indicative of a greater similarity in self descriptions for MZ twins; a similar result for the B1-B2 comparison would indicate more agreement between MZ twins on their descriptions of one another. Interpretation of the remaining comparisons will be discussed with the results.

The statistic selected to estimate the similarity between a pair of ACL profiles was derived by the following rationale. Consider any pair of ACL profiles to be a sample pair of vectors from a population of pairs of 300 element vectors in which each element is a dichotomous

random variable with a range of zero and one. Furthermore, assume that N_1 elements of the first vector are one (corresponding to the number of adjectives checked) and that N_2 elements of the second are one. Now, if we make the surely violated assumption that the probability of each element of each vector being equal to one is the same for each element, then we can specify the distribution of the vector product of the first vector and the transpose of the second (which we shall denote N_{12}). N_{12} is then analogous to the number of adjectives checked on both ACL profiles. A knowledge of the distribution of N_{12} , given N_1 and N_2 , enables us either to assign a probability to each sample comparison or to express it in standard deviations. This procedure attempts to eliminate the confounding of similarity with the number of adjectives checked; such confounding is inherent in a measure of similarity between profiles that is based on the raw number of adjectives checked on both profiles. This attempt is only partial, however, because of the required assumption that each adjective is equally likely to be checked.

The results presented for the overall comparisons employ two (MZ and DZ) by two (male and female) least squares analyses of variance of the standardized deviations of the similarity of each pair of profiles from a theoretical mean. For example, if two profiles on which N_1 and N_2 adjectives have been checked, respectively, and N_{12} adjectives have been checked by both twins, then the expected value of N_{12} is $N_1 N_2 / 300$ with variance $2 N_1 N_2$. Dividing the deviation of the observed value from expectation by the square root of the variance yields the similarity score used in the following analysis. Note that this value is a function of the number of adjectives checked by each twin.¹

¹It should be noted that this index of similarity is linearly related to the familiar phi coefficient.

Item Analyses

The overall similarity comparisons are clearly an instance of insufficient specificity. So many dimensions are composited that interpretation is difficult. This is particularly true if we recall Gough's (1960) reminder that two different subsets of adjectives may have very similar psychological meaning. It is therefore conceptually appropriate to look at the individual ACL items to determine their relationship to zygoty. The relationship between our sample size and the number of items is far less than ideal. This is a preliminary investigation, however, and each avenue to hypotheses should be explored.

A simple chi square statistic was computed for each adjective for each pairwise comparison of ACL profiles. This statistic was used to test a null hypothesis whose rejection would enhance the alternative hypothesis that a greater proportion of DZ twin pairs (in the case of cross twin comparisons) or DZ twins (in the case of comparing two ACL profiles completed by one person) disagreed on the applicability of that adjective than did MZ pairs or MZ twins. It should be noted that agreement may occur in two ways (both check or neither check); disagreement occurs when the adjective is checked on one profile and not on the other.

Once it was determined that an adjective had achieved significance ($p < .05$), a version of Holzinger's H was computed. These estimates should be interpreted cautiously because of the dichotomous nature of the dependent variable. The probabilities associated with the various intraclass correlations are not reported.

Due to the small sample size the sex classification were collapsed for the item analyses.

RESULTS

Overall Comparisons

Table IV.1 presents a summary of the raw data for the analyses of overall similarity of ACL profiles. These data are the means of the number of adjectives checked on both of the profiles being compared (i.e., the means of N_{12} computed for each pair of profiles). For example, the mean of 39.0 for female MZ twins is the average number of adjectives that these seven pairs of women agreed upon in their self descriptions (A1-A2).

Although each of the comparisons requires an independent interpretation, it is important to note that the raw means for MZ males are larger than those for DZ males in all nine comparisons while the females do not exhibit this trend. The analyses of variance on these data yielded only one significant main effect for zygosity and no significant interactions between sex and zygosity. The significant zygosity effect occurred for comparison A1-C1, A2-C2 ($F = 4.54$; $df = 1, 55$; $p < .05$). This result indicates that MZ twins checked more of the same adjectives under the two instructional sets A and C than did DZ twins. What this means is that the first member of an MZ pair expects his twin's description of him to be more like his own self description (and vice versa) than do DZ twins. This is of course what one would expect for physical descriptions, but it should be pointed out that the vast majority of the adjectives on the Gough check List do not refer to physical features but to psychological traits.

The next stage of analysis of overall comparisons involved the computation of the index of similarity discussed previously. Each of the raw number of adjectives checked on both profiles of a particular comparison

was transformed into an index of similarity score, and the index means were computed as presented in Table IV.2. A comparison of Table IV.1 with Table IV.2 reveals that the transformation to a similarity index has greatly enhanced the difference between MZ and DZ twins for each comparison except A1-A2. Also, an examination of the means in the two tables reveals that the significant F values in Table 2 are occurring because the transformed means for females exhibit the zygoty effect which is present in raw scores only for the males. If a greater similarity of MZ twins is assumed, then these results tend to support the validity of the similarity index utilized.

Seven of the nine comparisons indicate greater similarity ($p < .10$) among MZ profiles than among DZ profiles. Furthermore, in eight of the nine comparisons the zygoty differences are in a direction consonant with a genetic model that predicts a greater similarity of MZ twins. Strangely enough, however, the comparison that failed to show greater resemblances in MZ pairs is precisely the one for which it should have been most expected, i.e., self-description.

Item Analyses

The adjectives for which a significantly greater proportion ($p < .05$) of DZ profile comparisons were in disagreement (checked on one profile and not on the other) than MZ profiles are presented in Table IV.3. The adjectives in Table IV.3 are ranked according to the estimate of H' that was computed from the dichotomous data. In view of the basic concern of this research program it is most interesting that on the A1-A2 comparison the adjective atistic emerges prominently, and 67% of the variance in that trait is indicated to be genetic in origin.

Analysis of Test Measures

The objective tests involving perceptual functioning and aesthetic preference were analyzed by computing intraclass correlations for each measure and then estimating heritability from Holzinger's h^2 statistic. The results are presented in Table IV.4 below.

As Table IV.4 shows, the heritabilities for the Gottschaldt Figures and for the Quality rating of productions on the Franck Drawing Completion Test are .66 and .63 respectively. The comparable statistic for the Perceptual Acuity Test is .55. Finally, the human-empathic response to the M-threshold inkblots also shows high heritability of the same order of magnitude: an h^2 of .61 for threshold for human movement and .69 for volume. Neither the Barron-Welsh Art Scale nor the Child Esthetic Preference Test show the zygoty effect, however; aesthetic preference as distinct from perceptual and aesthetic performances do not appear to be related to genetic factors.

The interpretation of the adjective check list results is rather complex for several reasons: (1) the meaning of each comparison is unique and must be interpreted separately; (2) the sample size may have introduced inappropriate adjectives in the item analyses and excluded crucial others; (3) the translation of the adjectives from English to Italian for testing and from Italian to English for analysis may distort the results. A forthcoming analysis of the ACL scales as distinct from individual items will greatly enhance interpretation because a comparison with the data reported by Scarr (1966) will be possible.

Some of the results of the overall comparisons are puzzling. When the twins describe one another (B1-B2), the MZ twins are more similar.

When their self descriptions are compared (A1-A2), however, there is no greater similarity among MZ twins. There are at least two possible explanations of this result. First, the self description instructional set may be dominated by social desirability response styles that are not heritable while the description of the other twin is more objective. This line of reasoning would support a genetic explanation of the greater similarity of MZ twins on the B1-B2 comparison. Alternatively, the greater MZ twin similarity on B1-B2 may have resulted from a socialization experience that encourages identical twins to describe one another more similarly than are like-sexed fraternal twins. Gottesman's (1963) twin study with the MMPI fails to aid in the choice between these explanation. He reports an intraclass correlation of .32 ($p < .05$) for MZ twins and - .02 for DZ twins on the defensiveness (K) scale (statistics for the L scale are not reported) indicating a greater MZ similarity on a dimension closely related to our social desirability explanation. Furthermore, Gottesman found a greater MZ similarity ($p < .05$) on overall MMPI items (concordance of test behavior) when he scored one twin's answer sheet with the other's. Both of these findings by Gottesman suggest that we should have found greater MZ similarity on the A1-A2 comparison unless the ACL evokes a very different kind of test behavior than does the MMPI. The age difference between the twins involved in the two studies, however, greatly diminishes their comparability.

The overall comparisons A1-B2, B1-A2, and B1-C2, C1-B2 may be seen as measures of the ability of one twin to take the role of the other twin. For this sample of twins it is clear that identical twins are much better

at this task than the fraternal twins. Again, this result may be explained genetically or in terms of differential socialization of identical and fraternal twins. Previous studies with infants (Freedman, 1965; Freedman and Keller, 1963), however, have indicated that parents and pediatricians are often mistaken about the zygosity of twins and that these misconceptions do not affect the greater similarity of MZ twins on a wide range of dimensions.

Relevance to Artistic Potential and Creativity

The most important aspect of the Adjective Check List analysis for our present concern is revealed in the sets of specific adjectives that show greater concordance among monozygotic twins. As Table IV.3 shows, zygosity effects, taking all conditions into account, most frequently occur for adjectives like artistic, inventive, dreamy, imaginative, and original. The indicated heritability if these are considered as a cluster is in the range of .60 to .80; thus, approximately two-thirds of the variance in artistic creativity, assuming accuracy of self-description as well as description of self by cotwin, may be due to genetic factors. And, even stronger evidence is provided by the analysis of the test measures in the present study. Taken in conjunction with the perhaps merely suggestive results from the ACL analysis, they support the view long since advanced by pioneers in human genetics such as Francis Galton and Havelock Ellis that musical and artistic aptitudes run in families.

It should be noted once again that aesthetic preferences as distinct from perceptual and aesthetic performances do not appear to be related to genetic factors. Since aesthetic education may be most decisive in influencing motives and values, even though there is indeed a genetically

• determined aptitude which operates as a base for the development of artistic
• abilities, the cultivation of aesthetic sensibilities and the establishment
of motives to express them remains the task of such education.

TABLE IV.1

MEANS OF RAW NUMBERS OF ADJECTIVES CHECKED ON
BOTH ACL PROFILES IN NINE PAIRWISE COMPARISONS

Pairwise Comparison	A1-A2		B1-B2		C1-C2		A1-B2 B1-A2		A1-C2 C1-A2		B1-C2 C1-B2		A1-B1 A2-B2		A1-C1 A2-C2		B1-C1 B2-C2	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Monozygotic	39.0 (7)	43.5 (13)	26.1 (7)	36.3 (13)	23.6 (7)	35.7 (12)	38.6 (14)	39.6 (26)	25.5 (14)	37.7 (24)	27.1 (14)	40.5 (24)	36.0 (14)	50.3 (27)	37.4 (14)	57.3 (25)	25.2 (14)	48.8 (25)
Dizygotic	41.0 (4)	30.0 (5)	28.8 (4)	19.8 (5)	21.9 (4)	19.1 (5)	34.3 (8)	25.3 (10)	23.6 (8)	20.2 (10)	31.5 (8)	19.1 (10)	33.8 (9)	28.5 (11)	33.4 (9)	26.9 (11)	24.9 (9)	19.2 (11)
Zygosity F	.25		.41		.98		2.30		2.07		3.09		1.92		4.54		3.29	
Significance																		

Note--The numbers in parentheses are the number of twins or the number of twin pairs (depending upon the type of comparison) on which the means are based.

00052

TABLE IV.2

MEANS AND ANALYSES OF VARIANCE FOR THE
SIMILARITY INDEX OF PAIRS OF ACL PROFILES

Pairwise Comparisons	A1-A2		B1-B2		C1-C2		A1-B2 B1-A2		A1-C2 C1-A2		B1-C2 C1-B2		A1-B1 A2-B2		A1-C1 A2-C2		B1-C1 B2-C2	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
Monozygotic	4.70	5.45	3.43	4.12	2.74	3.83	6.24	4.77	3.22	4.06	5.17	5.23	5.87	6.26	7.62	8.64	4.53	6.17
	(7)	(13)	(7)	(13)	(7)	(12)	(14)	(26)	(14)	(24)	(14)	(24)	(14)	(27)	(14)	(25)	(14)	(25)
Dizygotic	5.45	5.12	1.90	1.72	1.11	2.54	4.06	3.55	1.44	3.04	4.02	2.61	3.24	5.31	5.19	6.00	1.72	3.81
	(4)	(5)	(4)	(5)	(4)	(5)	(8)	(10)	(8)	(10)	(8)	(10)	(9)	(11)	(9)	(11)	(9)	(11)
Zygosity F Value	.03		3.27		1.57		5.66		3.32		8.24		3.39		11.52		8.03	
Significance Level	<.10		<.025		<.10		<.01		<.10		<.01		<.10		<.005		<.01	

Note--See the note for Table 1.

00053

TABLE IV.3

ADJECTIVES AGREED UPON BY A SIGNIFICANTLY (p. .05)
GREATER PROPORTION OF MZ TWINS THAN DZ TWINS

<u>A1-A2</u>		<u>B1-B2</u>		<u>C1-C2</u>	
forgetful	.838	slipshod	.655	inventive	.790
artistic	.672	deceitful	.639	absent-minded	.745
honest	.624	inventive	.578	practical	.578
informal	.465	mild	.397	hasty	.431
wary	.465	simple	.397	greedy	.397
interests wide	.073	confused	≤.000	leisurely	≤.000
		evasive	≤.000		
		peculiar	≤.000		
		silent	≤.000		
<u>A1-B1</u>		<u>A1-C1</u>		<u>B1-C1</u>	
<u>A2-B2</u>		<u>A2-C2</u>		<u>B2-C2</u>	
dreamy	.600	wise	.744	forceful	.685
forgetful	.524	mature	.732	unselfish	.577
capable	.522	imaginative	.675	conscientious	.479
artistic	.515	idealistic	.601	imaginative	.475
conscientious	.462	unstable	.574	self-denying	.469
understanding	.416	restless	.559	dreamy	.450
silent	.282	confused	.441	complicated	.447
dependent	.233	hasty	.402	mature	.412
		defensive	.310	reliable	.397
		reserved	≤.000	stingy	.367
		submissive	≤.000	hasty	.293
<u>A1-B2</u>		<u>A1-C2</u>		<u>B1-C2</u>	
<u>B1-A2</u>		<u>C1-A2</u>		<u>C1-B2</u>	
slipshod	.733	absent-minded	.489	temperamental	.669
forgetful	.579	forgetful	.466	original	.566
original	.376	wise	.466	peculiar	.545
independent	.342	hasty	.398	evasive	.328
loyal	.296	emotional	.368	leisurely	.243
organized	.234	confused	.347	stingy	≤.000
peculiar	.216	artistic	.252		
reserved	.013	stingy	≤.000		

Note--The numbers reported are crude estimates of H.

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V. Aesthetic Education: Historical Background and Research in a Variety of Settings

A. Historical Background¹

From ancient times philosophy has been concerned with describing the nature and operation of perception, not only of vision but of all the senses. Plato, Aristotle, Aquinas, Descartes, Kant and others often formulated these questions by asking what it meant to say that something was beautiful, since the highest function of the senses was theorized to be the perception of beauty. In the 18th century Baumgarten characterized *aesthetics*, derived from the Greek word for "sensation," as a special branch of philosophy devoted to the study of the senses in general and the human experiencing of the beautiful in particular.

In the modern literature a dichotomy has developed between those who regard the aesthetic in a broad sense covering almost the entire range of human experience, and those who concur with the more traditional identification of the aesthetic with the philosophy of art, since art objects are prized primarily for their beauty, or their "aesthetic significance" (meaning the degree to which they stimulate and please the senses).

There are several histories of aesthetics available. One of the most readable is Monroe Beardsley's *Aesthetics from Classical Greece to the Present*, a short history which makes no distinction between "aesthetic" and "philosophy of art." The pioneering work in the field is Bernard Bosanquet's *History of the Aesthetic*, London, 1892, followed by the second part of Croce's *Aesthetic*, in the Ainslie translation, London, 1922. Gilbert and Kuhn's *History of Aesthetics* was reissued in 1954. For an excellent source-book of readings in aesthetics, "from Plato to Heidegger," see Hofstadter and Kuhn's *Philosophies of Art and Beauty*, New York, 1964.

¹Section A of Part V was prepared for this report by Stephen M. Dobbs; it is a condensation of a fuller account which he is submitting for publication in the *Journal of Aesthetic Education*.

Several theorists have attempted to provide some criteria by which we might recognize the aesthetic in experience. The psychologist Dale Harris (Harris, 1966) has described the aesthetic experience as follows:

Characteristically there is in the aesthetic experience a marked concentration of attention, a shutting out of peripheral stimulation. The concentration is almost hypnotic at times; the experiencer is enthralled and entranced. In many instances there is a distinct feeling of exaltation. (49, p. 18).

According to Arnstine, the experience must be apprehended "terminally" (as a thing-in-itself, for its own sake), and with affect (5, p. 247, 259) (39, p. 15). Dix requires that "energies have been organized rhythmically, harmoniously, and beautifully around a unifying purpose" (34, pp. 215-216). Purpose, emotional involvement, and the absence of ancillary values (such as pragmatic, moral, or other considerations) thus seen to be some of the prerequisite conditions for aesthetic experience.

The more traditional and popular view of the aesthetic is its identification with art and beautiful objects, since works of art are considered aesthetic objects *par excellence*. Those who think about the aesthetic entirely within the realm of the fine arts, or who use art as a point of departure, are usually willing to admit the possibility of viewing almost anything in an aesthetic fashion. But they choose to narrow the relevant phenomena to provide a manageable and meaningful study. Of course, "art" may itself be subject to liberal interpretation; as Villemain points out, it may refer in some quarters to "all purposive conduct falling within the range of qualitative predominance," which again refers to experience undergone primarily for its own sake, for the satisfactions it, rather than its consequences, provides (95, p. 31). John Dewey also speaks regularly of art in the broader sense of "experience conducted artfully," meaning done well and with attention to the importance of qualities (33).

But the stricter sense of the aesthetic with which we are dealing here is concerned with the perception and appreciation of art and other beautiful objects. Gotshalk sees the chief superiority of works of art for consideration as keystones of the aesthetic domain in their greater concentration of aesthetic values than other objects.

They possess intrinsically so much in so little, while natural objects and practical utilities, with notable exceptions, ordinarily have more diffuse or diluted aesthetic offerings (48, p. 12).

Sibley, in his "Aesthetic and Nonaesthetic," echoes the emphasis on the intrinsic qualities which works of art offer, and recalls the "thing-in-itself" criterion of the "global-aesthetics" school:

Persons have to see the grace or unity of a work, hear the plaintiveness or frenzy in the music, notice the gaudiness of a color scheme, feel the power of a novel, its mood, its uncertainty of tone. Persons may be struck by these qualities at once, or they may come to perceive them only after repeated viewings, hearings, or readings, and with the help of critics. But unless they do perceive them for themselves, aesthetic enjoyment, appreciation, and judgment are beyond them (80, pp. 136-137).

Even John Dewey, although opting for the broadest application of art in experience, recognizes that literature, music, painting, and other arts are "the chief agencies of an intensified, enhanced appreciation of the world" (34, pp. 278-279).

The literature of aesthetic education begins with art education, before any distinction of significance was made between them. The earliest writings in art education can be found in ancient philosophy. Plato advocated the cultivation of beauty, but less of the physical than of the intellectual and spiritual varieties. He distrusted painting, poetry, and drama for their representations of illusions and untruths (31, Pt. II, Ch. IX; Pt. V). But Aristotle counseled the teaching of drawing, to make men "judges of the beauty of the human form." He was also the first to recognize the non-

utilitarian value of the arts, as ends in themselves (67, *Politics*, VIII:3). Later philosophers, such as John Locke, considered drawing as a means of communication of ideas "ill-retained in the most exact descriptions" of words (55, pp. 136-137).

A more expansive function for art begins to develop with Friedrich Schiller's "On the Aesthetic Education of Man," written in 1793-5 (77). Schiller's faith in the power of the arts to liberate man spiritually, and eventually to reform society, seemed to know no bounds. Universal equality and fulfillment are, for Schiller, the expected consequences of widespread "communication of the beautiful" (77, p. 137-138). This imputation of social power to art is picked up by John Stuart Mill, who made the rather remarkable statement that art is "little inferior in importance to either religion or government" (64, p. 88). Mill described the culture coming through poetry and visual art as "the education of the feelings, and the cultivation of the beautiful" (64, p. 86).

In colonial America, Benjamin Franklin suggested that drawing was an appropriate means for training the eye and conveying non-verbal information, but no curriculum was devised to incorporate his proposals (102, p. 37). In some early schools, such as Boston's Temple School, children were permitted to draw in order to stimulate their imagination and train the hand and eye. But the most important development of this period for the progress of art education was Horace Mann's championing of drawing exercises, which "not only better enabled [students] to attend to the common duties of life," but made them "more likely to appreciate the beauties and magnificence of nature" (61, p. 132-135). No distinctions had yet been made between "art" and "aesthetic" education, but public schools began to experience, with the inclusion of drawing, a broadening of the curriculum that would some day make it possible for educators to consider extending the role of the arts in school life.

Any incorporation of aesthetic education into the school curriculum must depend on philosophical and social support. As Plato said, what is honored in a country will be cultivated there, and an examination of the role of the arts in schooling attests to the gap between eloquent manifestoes and actual practices. The ideology of educational fields, as it is represented in the professional journals and textbook preambles, is too often at variance with what transpires in the classroom.

Perhaps nowhere is this point better illustrated than in the arts. Hearing educators speak of their hopes for developing the total capacities of the child, especially as they did during the Progressive Era, one would have expected education in the arts to be at least a significant part of such plans. A typical statement is the plea that "all youth need opportunities to develop their capacities to appreciate beauty in literature, art, music, and nature" (69, p. 43) (Also, see 26, p. 54). But according to a survey of the teaching of music and art in American schools, conducted by the National Education Association in 1963, less than one out of every ten secondary schools requires a course in art for graduation, and only 15% of the students in those schools elect to take what art courses are offered. The situation in the elementary schools is quickly revealed by the disclosure that less than one in five school districts with 6,000 or more students required professional preparation in art education for a teaching credential (66) (Also, 6). There is sufficient evidence that school planners place a low value on the arts whenever a sacrifice is required to satisfy the needs of economy.

Of course, formal educational systems reflect the values of the societies they serve, so it is appropriate in trying to discern the basis for art's low priority to investigate general attitudes outside the school about the arts. Melvin Tumin has summed up the reasons why art has fared poorly

relative to other aspects of cultural life: art performs no feats of national valor, cannot claim responsibility for easing any of life's burdens, and is generally conceived of as a frill, a diversion, a luxury in life (92). The contrary view, that art experiences provide something vital to the quality of life, has apparently not impressed pragmatic Americans sufficiently to induce them to press for art experience in their children's education. In an extensive survey in which both lay citizens and educators were asked to rank the relative importance of sixteen subject areas, aesthetic development was placed twelfth by the educators and fourteenth by the non-educators (36).

In comparison, mathematics and science rank high, and consequently more support flows to curricula along those lines. For example, the Federal Government has spent more than \$100,000,000 in the last fifteen years on research in mathematics and science curricula, whereas until the establishment in 1962 of a program on the Arts and Humanities in the U.S. Office of Education, virtually nothing was done for art education. For a review of the progress which has been made in securing support, see Stanley Medaja's article on "Art and Government" (60).

Harry Broudy accounts for the unpopularity of art in education by citing the negligible scientific and technological value placed upon art in our culture (15, p. 409). His view seems especially cogent at a time when the nation is in the throes of social, economic, and political upheavals; few persons, it is clear, are willing to acknowledge that these problems might profitably be approached through art or from an aesthetic perspective. Moreover, there are complex historical reasons for the lack of interest or confidence in the arts, sometimes involving religious convictions which distrusted affect and regarded the arts as frivolous and even ungodly, and other factors involving the industrial revolution which made beauty and refined tastes a luxury.

something reserved only for those who could afford them (16, p. 37) (18, p. 45).

Thus contemporary art has little real impact on the lives of the mass public, and the consequence for education is that "aesthetic education has been handed over to the juke box, the disk jockey, the movies, the comic books, and television" (15, p. 409). Broudy presents a variety of good arguments for the average man's rejection of contemporary art: he doesn't understand what the artist is trying to accomplish, the new art often fails to be sensually pleasing and is grotesque and alien instead, and too much imagination is required to perceive the subtle qualities of feeling in inanimate things. Broudy's best explanation is that contemporary art lacks the conventional signals and stereotypes by which art of bygone eras apprised the appreciator of its intent. For example, the deemphasis on subject matter, and turning of attention to the format itself, as has occurred in painting, poetry, and theater, is puzzling and threatening to most people. As Broudy says: "The attention to formal properties as such is alien to the plain man, and without the familiar objects of common experience to serve as vehicles of aesthetic expression, the public tends to judge works of art as meaningless" (15, p. 398, 403-404, 410).

As Cyril Burt also points out, art has always been a powerful factor in shaping the growing child, but not in ways intended by either educators or parents: "The youngster will seek it [art] for himself--in the crude and popular forms of music or dance, in the movies and in television, and in the products of commercialized entertainment" (23, p. 28). Mass entertainment substitutes in most people's lives for the "bliss of beauty," and "rapture of fulfillment," which, it is claimed, experience in the arts may bring. Educators, ever aware of the pressures for "useful" schooling, disregard the

arts, and any form of education seemingly based on them, to bring their curricula in line with the values and expressed needs of the public whose schools they operate.

Among the schoolmen themselves, there is an even more damaging basis for excluding the arts and aesthetic education from higher priority: the widely held belief that experiences in art have little or nothing to do with knowledge, intellect, or thinking. The arts are relegated entirely to the domain of affect, of feelings and satisfactions. Perception, the keystone of artistic activity, is disdained, therefore, because it is not assumed to involve thought (3, p. 3). This misconception about the arts results in underestimating the importance of the senses generally. The un-employment of the senses and neglect of the feelings has been commented on by Suzanne Langer and others. Whitehead asserted the importance of sensory and bodily experience in education (99), and Dewey disparaged the separation of regular curricula from activities which elicited affective or physiological responses (33, 34). But the fact of life in schools is that/only of all the senses vision is given much attention at all, and that in a haphazard and unsystematic way:

The other senses are neglected if not positively despised. The rich world of textures and odors is not even respectable material for conversation in our culture, thanks to the fact that we do not encourage the child to live gladly in every organ of his body. (20, p. 423) (Also, 71, Chap. V)

One of the more subtle evidences of the general consideration of the arts as non-cognitive is the lack of attention given over to evaluating performance in art areas. Both school administrators and many art educators have held this view: if there is nothing "intellectual" to speak of, what would be measured? Why evaluate children on aptitudes which are probably inherited ("you either have talent or you don't"), and in any case manifest

themselves in the most ineffable expressions? What could be determined as "right" or "wrong"? The disposition to regard aesthetic and artistic experience in such manner is reflected by the paucity of available tests in Oscar Buross' *Tests in Print* (22). Only 1.4% deal with fine arts.

Faced with the unwillingness of parents to surrender their children's school time to activities to which they give low worth in their own lives, the educational administrator's dismissal of any contribution by the arts to the school's prime function of training the intellect and dispensing knowledge, and the average teacher's lack of professional preparation for teaching art, art and aesthetic education would seem to be lucky even to have survived in the school curriculum. But, surprisingly, such is not the case, at least not exactly the case. And here is where the distinction between art education and aesthetic education becomes more useful: for although what is called aesthetic education has not made it off the ground in most places, art education per se has long since earned its wings. Why?

Our contention here is that as American educational practice developed, a narrow conception of education in the arts took hold in the schools. "Art" education came to mean, primarily, education in the visual arts, and in most programs that was restricted to experiences in the making of visual art forms. Critical and historical matters, perceptual training, integration with the other special art forms, and other functions claimed for the "aesthetic" were largely ignored at the elementary school level, and only infrequently developed in secondary schools. Indeed, many of the leading texts in art education through the years, such as those of Mathais, MacDonald, Winslow, and Faulkner, fail to discuss the broader possibilities of aesthetic education. During all this time, teachers of the visual arts, music, drama, literature, and dance were separately departmentalized and funded, preventing

coordinated efforts to expose students to integrated programs of aesthetic materials and experiences. Many persons merely equated the aesthetic with the decorative or formal anyway, and thought it an inappropriate area of concern for serious schooling. It is safe to say that any distinction which existed between the historical practices of art education, and the arrangements of a broader vision of aesthetic education, was ultimately trivial and mostly bound up in semantics.

The concept of aesthetic education was introduced in the post-World War II era by Sir Herbert Read, whose *Education through Art* continues to be one of the most widely read books in / aesthetic education (72). Read believed that through art man "achieves his humanity," which is to / say that he comes to recognize the commonalities among men. Art for Read is a product of the "play instinct" developed by Schiller, and through guided experiences the moral and intellectual development of the child is made more efficacious. Read explained his expanded notion of the aesthetic in the following:

What I have in mind is not merely "art education" as such, which should more properly be called visual or plastic education: the theory to be put forward embraces all modes of self-expression, literary and poetic (verbal) no less than music or aural, and forms an integral approach to reality which should be called *aesthetic education*--the education of those senses upon which consciousness, and ultimately the intelligence and judgment of the human individual, are based (72, p. 7).

Read is championing education which attends to *sensibility*, as the "human quality underlying all processes involving skill, all achievements displaying taste" (71). Although this sounds like the dictums of the other manifestoes we have mentioned, Read recognizes to some extent that practical problems of schooling require organizational and operational guidelines.

But recognition is not the same as concrete ideas for translating objectives into a methodology. Read wants to use the arts co-operatively to develop in a harmonious fashion the sensibilities of the child, with the

training of perception guided towards the cultivation of taste and the expression of feeling. Using art objects, which offer paradigm models of structure, relationship, and form, the child can learn to communicate his ideas at a level commensurate with his subjective relationship to the world, according to Read (72, pp 8-9). But no attempt is made to concretize these ideas, other than recommending techniques already in practice in selected successful art education programs. Read also neglects the empirical realm, thus avoiding consideration of whatever the behavioral sciences have been able to learn about the aesthetic element in personality or "aesthetic behavior."

This deficiency must also be lodged against the other prominent authority in art education during the forties and fifties, Viktor Lowenfeld. *Creative and Mental Growth*, first published in 1947, and probably the classic book in modern art education, echoes many of Read's sentiments, in particular the marshalling of educational forces, including art, for the development of the creative and mental assets of the child. Lowenfeld stressed process over product, and a stage theory of growth, including an aesthetic component, was charted (56). But Lowenfeld, like Read, did not back up his ideas empirically, and by the 1960's some art educators, and those with an eye on aesthetic education, were unwilling to perpetuate on the basis of traditional authority what amounted to the practices of the Progressive Era in art education. In the fifties Progressive Education in all subject fields was beginning to fade away, and a kind of opportunity for those in art presented itself.

That opportunity became a revolt, which although not yet spread beyond the palace, has helped introduce rigor and direction to art education. The prime complaint against the old view was that it conceived of art *instrumentally*, a helping and assisting function for other areas of learning or in the school generally. This notion had tended to restrict the development of

art programs to guidelines which might have been appropriate for other activities, but not necessarily for art. So, for example, children needed relief from "work," and the posters had to be made for elections and dances, so a production-oriented curriculum resulted. Non-artistic outcomes gave art a role, but not the one it could and ought to have had, which was to develop experiences that only aesthetic values could provide. The new movement, then, began to formulate rationales for art which were more centrally focused on the intrinsic benefits of the discipline.

Another consequence of the sobering realizations of the last decade was the understanding that unless the objectives of aesthetic education became more realistic and concrete, the field would be still-born if it managed to emerge at all. The motto on the title page of De Garmo's 1913 *Aesthetic Education*, "an aesthetic view of the world for every child," and all of the many statements of that kind, would not break the ice with hard-nosed school administrators who had the power to install experimental curricula. The objectives have, therefore, become more manageable. One educator who deserves much of the credit is Ralph Smith, editor of aesthetic education's only journal, and an influential voice in art and aesthetic education:

The first thing to be realized about aesthetic education is that it has to do principally with perceiving, noticing, or feeling the qualities and powers of works of art . . . [our purpose is] to judge, describe, explain, interpret, and evaluate the characteristics of works of art. (86, pp. 8, 11)

Smith's major contribution is his emphasis, and consequent methodological work, on the last part of his statement: the various functions of criticism. It means that students would be taught not just what to look for, as in the old art appreciation movement, but also how to express and defend their aesthetic judgments. Thus aesthetic education promotes, in Smith's phrase, "enlightened beholding," which refers to the ability to ground one's responses in relevant criteria and give reasons for what is seen, heard, and felt

(82, p. 14).

The turn towards criticism by Smith and others represents a central theme in the ideology of contemporary aesthetic education. It claims for artistic and aesthetic activity a cognitive and intellectual aspect traditionally denied, as we discussed before, for the arts. Yet thinking is a vital component of aesthetic experience, as persons both in the arts and other areas can attest. Perhaps the most eminent educational theoretician in America, Jerome Bruner, writes in his "Art as a Mode of Knowing," that the characteristics of connectedness, effort, conversion of impulse, and generality, which are part and parcel of art and aesthetic experience, thus entitle it to the realm of "knowing" and cognitive activity (19). Dale Harris, a psychologist who has worked on the problems of using children's drawings as measures of intellectual maturity, (see Harris' book, *Children's Drawings as Measures of Intellectual Maturity*, New York: Harcourt, Brace & World, 1963.) says the aesthetic experience is "known as well as felt" (49, p. 22), and the well-known British psychologist, Sir Cyril Burt, says of the aesthetic:

Like other types of experience, it is primarily a form of cognition--a mode of awareness, of perception, or we should perhaps say, a mode of apprehension . . . [we apprehend] a special kind of order, a systematic structure (23, p. 27).

The Belgian aesthetician, E. Tainmont, says "aesthetic judgment must be based on cogent reasoning faculties" (91, p. 28). Of course, this entire theme is not exactly new, but not since John Dewey argued for the integration and interdependency of intellectual and aesthetic experience in *Art as Experience* has the role of the cognitive been accorded so much importance, nor defended so vigorously. (Dewey probably had such an idea in mind long before 1934. See his *How We Think*, 1910. In one of the best contemporary accounts of the role of intelligence in art activity, David Ecker has used Dewey's steps for

problem-solving to elicit a structure for aesthetic, or "qualitative problem-solving" [40]. Also see Elliot Eisner's "Knowledge, Knowing, & the Visual Arts" [43]. Finally, there is Broudy's "Structure of Knowledge in the Arts" [18].)

What does empirical research have to offer to back up the claim of aesthetic educators that experiences in their domain have a knowing or cognitive element? Eysenck had found a general factor running through judgments made on diverse sets of stimuli regarding the aesthetic sense, which was distinct from general intelligence (45). But Child, in working with college populations, found that aesthetic judgment and preference were substantially associated with such variables of personality as the ability to tolerate cognitive complexity (30). Child also showed, in a line of studies on the theme of preference and judgment in art, that judgments as to aesthetic merit show considerable consistency among experts, even those of different tastes or preferences (27, 28, 29, 30). This suggests to Harris the strong presence of cognitive elements in aesthetic sensitivity (49, p. 19). Barron, Getzels and Jackson, and others have also wrestled with the problems of cognitive complexity and perception of visual forms.

In an older study, from 1945, Eckert found that art education graduates possessed "a significantly integrated kind of personality which most progressive educators emphasize as constituting an important goal of educational experience," including strong tendencies to intellectual flexibility and tolerance (reported in 100, p. 397). We also have indirect evidence from Machotka's 1966 study of aesthetic criteria by which children evaluate paintings: analysis of their responses suggests developmental levels which parallel Piaget's types of intellectual functioning (59). Finally, as far as correspondence between tests in art and in intelligence, Bolton found in a comparison of the two best known tests, the Meier Art Tests and the Graves

Design Judgment Test, that the Meier furnished a higher correlation coefficient with general intelligence than did the Graves (11, p. 222).

Aside from the development of theoretical and empirical ties between aesthetic activity and intelligence, or efforts to show the appropriateness of cognitive structure in the arts, interested educators have sought other rationales provocative enough to justify attention to the incipient discipline. Smith speaks of the practical consequences of multi-dimensional artistic activity, such as exists in the communications media, on a democratic society (82, p. 15). Villemain and Harold Taylor also have argued for an educational concept unifying the values of art and a democratic social framework (94) (2, pp. 92-96). Smith also emphasizes the ways in which the conception of "artifact" or "art object" might be enlarged to include items of social concern: for example, he sees a role for aesthetic education in developing a sense of "environmental responsibility" among young people ("perhaps environmental planning is *the* master art, requiring the greatest ingenuity and creative imagination" [83, p. 20]). Kaelin, Kaufman, Hausman and others have asked that aesthetic education focus on its capacity to facilitate the development of openness to experience, to increase communication among human beings in our troubled social structure and strife-torn cities. (see Eugene Kaelin, "The Existential Ground for Aesthetic Education," *Studies in Art Education*, VIII:1 [Autumn 1966] 3-12. Also, Irving Kaufman, *Art and Education in Contemporary culture*, New York: Macmillan, 1966.) Finally, some aesthetic educators have taken up the theme of using art experiences to work with disadvantaged children, to show art's social power and remedial benefits for children who won't respond to any other phase of school experience. This is, initially of course, the old instrumentalist idea, but the eventual outcome sought after is a meaningful place for art in the lives of these children.

The movement of rationales for aesthetic education towards some kind of amalgam of the personal value of the aesthetic with the social importance of art seems to be in the cards. Harry Broudy, along with Ralph Smith a leading contemporary writer on the topic of aesthetic education, cites the breakdown in values in the society as causing a crisis which contemporary art forms could help alleviate. Their purpose, in Broudy's opinion, ought to be the provision of cues and signs of the reality for which the old behavioral forms are not inadequate. For example, art could be used to reinterpret (in literature, on the stage, in the plastic arts, etc.) and give vitality to new forms of courage or heroism, as a moral substitute or equivalent of now-obsolete war (14). What Broudy is suggesting amounts to more than participation in the contemporary art of the day, whether producer, consumer, or "beholder" (to use Smith's phrase). It evokes the notion of a new life-style, a context for giving things value, which aesthetic education, perhaps using art as a point of departure, might treat in the schools.

This broad expectation for aesthetic education is different from what we have seen before. First, there are people in the field who are addressing themselves seriously to the possibilities for aesthetic education, and not merely as rhetorical frosting for art education conferences; they understand the political problems involved and have tried to meet some of them by arguing for a re-valuing of the role of the arts, and a recognition of the society-prizing cognitive factor. Second, there is a crisis of sensibility in our society, the onrushing technological revolution and alienation of man, which compels fresh thinking and approaches to the goals of the school and the content of its curriculum. The arts and aesthetic experience may provide a "countervailing tendency" to the depersonalization of the society. Third, the tremendous increases in art activity in the society during the prosperous fifties and sixties, although not reflected in widespread innovations in art

education in the schools, suggests that educators ought to pay more attention to the place of artistic activity in the life of man.

Finally, something ought to be said about the literature's treatment of the teacher of aesthetic education. De Garmo, back in 1913, had the first word on the subject: he stated that aesthetic teaching was defective because it was left to specialists, and therefore covered "only a part of the world that is beautiful" (32, preface). Although he was speaking of art teachers, there is a good point here: that teachers in other subject areas might also incorporate attention to the peculiar "beauty" of their disciplines in their curriculum (76) (95, p. 28). De Garmo also specified his requisites for aesthetic training, the most important consisting of giving the pupil a *first-hand* view of the beauties of the world, having developed the capacity to do so (Ibid).

In a more modern vein, Harry Broudy's article "The Preparation of Teachers for Aesthetic Education," specifies two types of personnel which might be considered: the generalist, who has no special abilities in any of the arts, and the traditional specialist. His alternative to these is the "monospecialist with a generalizing potential" (17, p. 30). More specific criteria are outlined: some performance competence in creating art, a thorough background in art history and of one art in particular, courses in the philosophy of art or aesthetics, and intern teaching and clinical experience in art classrooms (17, pp. 30-32).

Probably the most ambitious and idealistic conception of teaching as an aesthetic educator is that offered by Donald Arnstine in his "Aesthetic as a Context for General Education." The art teacher in his scheme becomes the "aesthetic consultant for the entire school," and manages a program of experiences which pervade the curriculum (4, p. 20). Feldman also conceives the role of the aesthetic educator broadly, but in a different way: every

teacher takes on its characteristics:

Even a statistic can become an event in the life of the imagination when the skillful pedagogue joins it with some evidence of quality (46, pp. 227-228).

Whatever aesthetic education is, and whatever part it may play in the life of the school, the ideal of a life-style predisposed to the values of criticism, beauty, unity, enlightened judgment, integration, and all the other components claimed for the aesthetic experience, will live on in the hearts if not the curriculums of aesthetic educators. Only the most romantic among them, however, will decline the opportunity to descend from the heights and inject their values into the educational institutions of an increasingly open and vulnerable society. The political lessons have to be learned, and the methodological preparations completed. It is too much to hope that the entrenched forces of the "academic" subject matters will turn over to aesthetic education the massive responsibilities which some writers flirtatiously covet; rather, by patient demonstration and careful evolution of its theory and practices, aesthetic education could become a significant force in the curriculum and thus have impact on future conceptions of schooling.

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1. The International Child Art Center

The Center functions both as an international gallery of children's art and as a place where pre-school age children (3 to 5) may be given the opportunity to work with simple materials under the guidance of a teacher. As a gallery it has housed numerous exhibits from all over the world, and it is one of the many attractive features of Ghirardelli Square in San Francisco. As a school, it has several locations throughout the city for its permanent programs, while also maintaining an occasional facility at the gallery where children may visit with their parents for just a short time and yet have the opportunity to work with art materials and a teacher.

Its philosophy was stated as follows by the head teacher, Diane Gundelfinger, at the time this research began making observations at the Center.

Philosophy of the International Child Art Center

We believe that children at a very early age have the urge and the ability to express themselves visually. If they do not encounter obstacles in their environment and are ~~not~~ subject to crippling adult judgments, they will enter freely into the process of inventing and developing visual symbols to describe the world in which they live. As the child gains control over the materials and can make coherent his inner images, he is creating a vital aspect of himself.

The manner in which a child depicts objects reveals much of how he feels and sees himself and the world. His pictures provide a means whereby the adult can grasp some understanding of the child's mind. Through his paintings and drawings the child can communicate experiences which might otherwise remain mute and inaccessible.

For some children more than others, painting and drawing serve best their need to communicate ideas, feelings and images. Even as

early as two, children will begin to draw representations of everything in their environment that is of importance to them: people, animals, houses, trees. These children create a whole world of child art, which is a source of astonishment and delight to adults.

We as adults must be careful not to impose an esthetic on the child, even one pertaining to his own art. Though we know that children do feel a definite emotional response to the elements of balance, color and design that appear in their paintings, sometimes other factors will operate so that the child will destroy or overlook these values. Sometimes he will pile on the paint to see what happens when one color is placed upon another, or he may simply undo what he has done. This is all part of what is happening to him and it is important that we do not impose a judgment. If instead we empathize with the child's sense of satisfaction and tell him: "that is exciting," "you have seen a lot" or "you have used beautiful colors," we give him support and do not place a value on his work.

We know that at a given age children go through certain characteristic phases of development. Within these similar phases there are immense individual differences. It is significant and important that we see the similarities and are aware of the importance of visual symbols as a means for children to communicate over the language barriers. Yet it is even more important to be sensitive to individual differences and to the form they take.

A teacher must use the techniques of teaching and the materials of art as vehicles to help the child realize his individuality. In our teaching experience we have found that where materials are kept as simple and pure as possible, the images that the child observes or

imagines have the best chance of being communicated clearly. We use paint, chalk, crayons, felt tip pens, and one or two sculptural media, such as clay or wood. The materials are simply the means through which a continuing inner process is realized. When we look upon the material as a channel through which the personality is developed, we convey to the child a sense that the value in the material is inexhaustible. If we ourselves feel this excitement each time the paints are opened and placed before the child, his interest is aroused and sustained.

While we realized that research with children in this setting might prove very difficult, we determined nevertheless to have a go at it. In part, we were seeking to discover the limits within which research in aesthetic education would be possible. We were also, of course, interested in casting some light on the developmental sequence in aesthetic judgment and expression.

We worked with 41 children, 17 boys and 24 girls. We were able to administer the Barron-Welsh Art Scale to 40 of the children, individually of course. The process was very time-consuming and required a lot of patience because of the short attention-span of the children and the fact that there are 50 items in the test. The results could not be interpreted as chance responses, as the mean of the group was 22, 25, with a standard deviation of 10, 31, whereas the expected score for random choice is 30 (see Table 5.1). The children were not doing as well as if they had responded randomly, a finding which emerged also on the Child Esthetic Preference Test, in which a mean score of 14.88 for 36 pairs of slides, each of which was scored either Right or Wrong, was obtained by this sample. The experience of the principal investigator in administering these two tests to these

children and later to a group of second-graders is that the children are in fact responding in terms of their likes and dislikes, for these they verbalize in a convincing manner. Basically they like simple, symmetrical figures on the Barron-Welsh Art Scale, emitting various sounds of dislike or disgust upon seeing very complex, asymmetrical, or apparently disorganized figures, which are usually dismissed as "messy." On the Child Esthetic Preference Test they like strong, bright colors, realistic scenes, and simple figures. They especially like reds, blues, and greens, and dislike black, purple, and brown and, to a lesser extent, yellow.

In order to obtain products of their expressive behavior in a standard format, we employed a children's drawing book ^(No War Toys book) in which a basic scene was delineated and in which they were asked to elaborate its particulars by drawing and coloring. These products were rated for artistic potential.

Finally, we induced the teacher, somewhat against her will, to rate the children's own free-response drawings and paintings for creativity. These products represented what could be saved of the child's output over a 6-week period.

The correlation results were meager, to say the least. Nothing correlated with the teacher's ratings, a finding which need not cause dismay in view of the reluctance with which they were given. The standard format provided also failed to correlate consistently with the other variables. However, the two test measures (the Barron-Welsh Art Scale and the Child Esthetic Judgment Test) did show a high positive correlation among the boys, though not among the girls, where in fact it was negative. Overall, nothing significant emerged, save perhaps the conclusion that the individual child of this age is not yet sufficiently organized and differentiated in terms of adult criteria of expression and bases of aesthetic judgment to

produce consistent relationships among the formal variables of our research. Even this must be advanced very tentatively, of course.

One aspect of this research, ominous for the researcher, was to be repeated in other studies, however. Teachers concerned with the creative activities of their students are loath to make ratings or judgments of artistic potential or ability, and in fact seem not to produce a valid basis for further work, as we shall see later. One conclusion we have come to, and hold quite firmly, is that if you want to get an estimate of a young art student's potential, *never* ask his teacher. In retrospect, this seems quite as it should be, and consistent with what we know of the creative process, which requires a certain suspension of judgment in its early internal formative stages.

TABLE V.1
International Child Art Center Study

	Total Sample			Boys			Girls		
	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.	N	$\bar{X}$	S.D.
1. Teacher ratings of creativity	41	3.07	0.838	17	2.94	1.06	24	3.17	0.624
2. No-War Toys Book rating (x 10)	28	18.39	7.32	12	16.25	7.94	16	20.00	6.37
3. Barron-Welsh Art Scale	40	22.25	10.31	18	24.67	10.77	22	20.27	9.50
4. Child Esthetic Preference Test (36 pairs of slides)	16	14.88	3.50	8	15.38	2.74	8	14.38	4.06

Intercorrelation of Measures

	N	2.	3.	4.
1. Total sample	27	0.103		
Boys	11	0.073		
Girls	16	-0.101		
2. Total sample	24	0.113		
Boys	11	0.378		
Girls	13	-0.121		
3. Total sample	15	-0.080		
Boys	7	-0.261		
Girls	8	0.000		
4. Total sample	15	0.064		
Boys	7	0.602		
Girls	8	-0.207		

2. Second-Graders at Vallecito Elementary School, Lafayette, California

This suburban public school in the San Francisco Bay Area provided the setting for a study of slightly older children (6 to 8) than we had worked with at the International Child Art Center. After preliminary conferences with the school principal and the teaching staff, the principal investigator was welcomed into a second-grade class for one morning a week, for a period of ten weeks. He was introduced to the children as a visiting teacher, and he was more than pleased after the third week to hear himself described by one child to another as "a teen-ager who's trying to learn how to teach."

Our goal in this instance was two-fold: once again to administer some of the tests used in the adult research to see whether and what they might be discriminating in children, and secondly to relate test scores to teacher ratings of creative potential. We used the drawing book, the Barron-Welsh Art Scale, and the Child Esthetic Preference Test once again, and this time added the Barron M-Threshold inkblots and the Symbol Equivalence Test in a form simplified for children.

The tests were introduced in a context of "having fun doing different things," implying doing things differently as well. We began by using the method of symbolic equivalence applied to numbers, asking the children to say, e.g., whether a given digit might be a boy or a girl, or a daddy or a mommy, or a dog or a cat, etc. (Knapp has published a series of studies, discussed below, which demonstrate consistent symbolic equivalences of this sort for digits and letters of the alphabet. His work employed adult subjects, and this study, carried out in collaboration with Knapp, extended his findings to children.)

We then moved on to natural objects as stimulus images: first, the sun, then the moon, then mountains, trees, lakes, etc. From there we went

to more abstract contextual stimuli, such as the seasons of the year, various holidays such as Christmas, Easter, birthdays, etc. We concluded with equivalences between body imagery and mechanical devices (What's like a heart, what's like eyes, ears, legs, etc.) In the first phase of this work, we would present the stimulus image and encourage free response, aloud and ad lib, from the entire class. (For example: "All right, now, what's like the sun?" Typical answers: a ball, an orange, a lamp, a balloon, a penny, fire, a laser beam. "What's like the moon?" Answers: a peach, a piece of cheese, a yellow ball, a banana.) This last captivating response of course led to a consideration of the phases and fickleness of the moon compared with the sun, and we were soon back to number equivalences, mommy and daddy, etc.

The Measurement of Symbolic Scope in Children

The Vallecito project, together with the Art in the Park project to be described in the next section of this report, led us to new measurement efforts that we think are important to basic questions in aesthetic education, and we shall therefore go into more detail at this point.

"Symbol" is defined in Webster's *Unabridged Dictionary* as "a representation; an emblem; a sign; an image; a token." Its derivation is from the Greek "sym," meaning "together," and "bollein," "to throw."

Philip Wheelwright (1962) in *Metaphor and Reality* defines a symbol as

. . . a relatively stable and repeatable element of perceptual experience, standing for some larger meaning or set of meanings which cannot be given, or not fully given, in perceptual experience itself.

Wheelwright thus stresses the synthesizing, stable and repeatable nature of symbols.

The inability of a perceptual experience to encompass precisely its consciousness its larger meaning is emphasized by Jacobi (1964). He defines

symbol as

. . . the best possible formulation of something unknown which cannot conceivably be more clearly or characteristically represented . . . it expresses facts, relationships and sensuous and emotional experiences too complex to be conveyed by intellectual formulation.

Rosemary Gordon (1963) agrees with Wheelwright's delineation of the synthesizing function of symbols. She makes reference to Leopold Stein's paper on "What is a symbol supposed to be?", as a guideline for definition. Stein stated that a symbol is the "throwing together [of] such things as have something in common."

Gordon writes that the primary significance of the symbol is to "mediate between the known and the unknown." Radhakamal Mukerjee (1959), in *The Symbolic Life of Man*, in like fashion states:

We have considered the symbol as an elastic bridge between reason and phantasy, instinct and society, inner experience and outer reality."

He goes on to explain the origin of symbols as arising out of man's adaptation to reality:

It [the symbol] springs from his basic need to apprehend the world in its unity and togetherness as scientific hypothesis, aesthetic apprehension, metaphysical intuition and religious ecstasy.

Mukerjee agrees with Wheelwright that symbols serve as a stable part of the environment:

. . . they give conscious direction not only to his social relations and evolution but also to the integration of his personality.

Both Gordon and Mukerjee state that symbols link the conscious to the unconscious.

In contrast to these scholars, Gerard De Wit (1963) takes note of the non-universal, personal characteristics of the symbol. He observes, in *Symbolism of Masculinity and Femininity*, that symbols serve to excite images

or reflections of personal, as opposed to universal, experience. De Wit defines the symbol as follows:

. . . symbols . . . function as pictorialized representations of personal conceptions of the referent concerned.

To summarize, it can be said that a symbol is a fairly stable, synthesizing, repeatable element of experience that serves to unite the conscious with the unconscious and aids adaptation of the inner-personal world to the outer world. An aspect of reality which exists first of all in itself, and not as a symbol, is made use of by the mind to stand for other realities.

If one thinks of symbols in this fashion, a simple and interesting empirical question arises. What makes a given aspect of reality apt for symbolization? Further: do symbols differ in their degree of aptness or fit? Are some persons better able than others to perceive symbolic equivalences and thus to make more extensive and more elegant use of the realities available for symbolization?

These questions provided the impetus for our inclusion of measures of symbolic scope in our research. They led also to the collaboration with Professor Knapp, who quite independently had initiated his empirical work with the method of "symbolic equivalents" in the early 1960's.

The published Knapp studies are: "On the surplus meaning of numbers" (with R. Chen) in *Psychological Reports*, 1964, pp. 319-322; "A study of mathematical ability involving digit relationships," H.E.W. Report #15, 1967, pp. 1-38; and "A study of semantic associations to the alphabet" (with H. Ehlinger) in *Perceptual and Motor Skills*, 1969, pp. 939-942. The basic Knapp findings which were repeated in our study at Vallecito Elementary School were that 9 was most often selected as the Father number, and 8 the Mother; 1 was a Boy number, 2 a Girl number; and 3 and 7 were most often "Me." Further, soft colors were usually associated with even numbers, and

hard colors with odd. Letters in the alphabet are "friendlier" from A to O, then become progressively unfriendlier (an exception being S), the last five letters being assigned such characteristics as "hard," "ugly," and "unlucky."

The lesson to be learned from all this is that symbols which usually are used in a denotative way are also fraught with connotations and are actually part of a complex symbolic network. While they are commonly instrumental in a literal statement, the apperceptive mass activated by them leads readily to non-literal or metaphoric statements which very often are outside the central focus of consciousness. Awareness of this, and technical command of it, is the secret of the artist and poet, and for this reason we have made it a central part of this research.

In the Vallecito study, twenty-two stimulus words were read, one at a time, to each child (11 boys and 9 girls). The children were tested individually, and each was told to tell what each word (or image) reminded him of. For example, the tester asked, "What is the sun like?" and the child's answer was recorded verbatim by the tester.

The analysis of the results of the test responses needs to be divided into two parts for each symbol stimulus: 1) the nomothetic results, extracting the common properties of the responses in order to delineate the general characteristics of each symbol stimulus; 2) the idiographic results, separation of the creative and original or unusual symbolic equivalences from merely descriptive or banal associations.

The stimulus images in the Vallecito study can be divided into four basic categories: 1) earth cycles--Sun, Moon, Night, Day, Spring, Summer, Fall and Winter; 2) colors--Red, Green, Black, Blue, White, Yellow; 3) religion--God, Church, Priest, Easter, Christmas; 4) family and school--Father

Mother, Teacher.

Sun yielded responses using such of its aspects as shape, luminescence, power, color, fertility, and ability to burn and give heat. Several children's responses emphasized its *round shape* ("moon," "ball," "ball of fire," and "ball of string"). The sun's *luminescence* is recalled in light-giving response images ("moon," "heat lamp," "laser beam," "fire" "star"). The sun is equated with *celestial* quality or heavenly body ("moon," "star"), and is a *heat source* ("heat lamp," "ball of fire"). Its *rays* are characterized in "laser beam" as well as is its *power*. "Yellow flowers" shares the sun's *color*, and are products of its *fertility*. "Outside play," "swimming," and "summer" all share the sun's properties of *daylight*. The most original symbolic equivalence for sun was the response "laser beam," because it bypassed the usual associations to shape, light and heat; it took note of the *power* as well as of the *rays* or arms of the sun.

Moon evoked associations of *round shape* ("ball," "circle," "sun"), *luminescence* ("lamp," "sun"), *color* ("clouds," "lamp," "banana") and *celestiality* ("clouds," "planet," "sun"). The moon is *land* to "martians" and "astronauts." An original symbolic equivalence to moon given by one child was "banana"; this response takes note of the man's shape in its crescent phase and of its color in a particular relationship to the atmosphere (i.e.--the moon looks yellow when there are heavy concentrations of dust in the atmosphere).

Night is mainly associated with the sense of sight, as shown in the children's responses. Night stands for *darkness* ("bed," "lights," "stars," "spirits," "movies"), half of the *sun-earth cycle* (its partner is "day"), as well as the black magic of the *unconscious* ("wishes," "spirits"). There were no notable original symbolic equivalences given to this group of children to

night.

Day is a source of *light* ("summer," "play," "school," "Saturday," "bike rides," all implying the necessity for light), a time for *play* ("summer," "Saturday," "TV," "bike rides"), and to some degree *freedom* ("play," "Saturday," "summer," "TV," "bike rides"), a time when children can do what they want to do. Many children took note of the other half of the *earth cycle* ("night"). There were no particularly original symbolic equivalences for *day*.

The four seasons were given, each as a separate symbol stimulus. The children's responses to Spring and Summer were fairly uniform. The responses indicated that both Spring and Summer are symbols of sight and touch. Both were equated with *daylight* (Spring: "sun," "summer," "swimming"; Summer: "sun," "swimming," "play"), *fertility* (Spring: "sun," "flowers"; Summer: "sun," "swimming"), and other *season cycles* (Spring: "summer"; Summer: "spring," "winter"). Spring is also a symbol of *life* ("flowers," "animals," "sun"), while Summer is also equated with *de-emphasis* of work ("swimming," "play").

Fall and Winter also yielded responses that equate them with sight and touch. Fall is connected to *transition* from Summer to Winter ("winter," "leaves falling"), is equated with *coldness* and *wetness* ("rain," "hibernation," "winter," "wind"), and is a time of the *approach of vulnerability* to the elements ("wind," "hibernation," "rain"). Winter signifies *coldness* ("ice," "snow," "skiing"), and *hardness* ("ice"). White is the *color* of Winter ("snow," "ice").

Among the color symbol stimuli, Red, Green and Yellow were equated with *life* or *life source* (Red: "roses," "blood," "apple"; Green: "grass," "leaves," "plants," "trees," "greenhouse," "mint"; Yellow: "flowers," "sun,"

"lemon"). Red was associated with the sense of touch--it is *hot* ("blood," "volcano," "fire"). Green and Yellow got responses equating them with *fertility* (Green: "grass," "leaves," "plants," "trees," "greenhouse," "mint"; Yellow: "flowers," "sun," "lemon"). One original symbolic equivalence to Green was "martians"; the child used his imagination to depict the color of people from outerspace.

The color-stimuli Black, Blue and White yielded few interpretable equivalences. Black drew very few associations at all, but was primarily equated with *night* ("night"). Blue was equated with the natural elements of *water* ("lake") and *air* ("sky," "air"), while it is *celestial* ("sky," "air"). White is a difficult symbol to interpret from this group of children. The responses "cement," "plaster," "paint" and "movie screen" all connote a *hard surface*. Only "snow" refers to the traditional interpretation of *purity*, while "sky" and "light" reveal White's *clearness*.

Among the religious symbol stimuli, God connotes *power* ("sun," "priest," "father," "Jesus"), *patriarchy* ("father," "Jesus," "priest"), *celestiality* ("Jesus," "sun," "heaven"), *invisibility* and *intangibility* ("ghosts," "Jesus," "angels"). Some responses associate God with *death* ("Jesus," "ghosts," "angels," "heaven") and *messengers* ("Jesus," "ghosts," "angels," "stories," "propnets," "priests"). Church is associated with a *communal gathering place* ("chapel," "castle," "school," "building with cross") for *learning* ("school") to pay homage ("mass," "bread," "music," "kneeling," "prayers," "worship") as a form of *tribal communication to divinity* ("God," "Jesus"). Priest is a *patriarchal* symbol ("God," "Jesus," "minister," "father") of *power* ("God," "Jesus") and of *worship* ("praying," "bread"). The holidays Easter and Christmas were barely recognized by the children as a *religious* symbol and were mainly shown to be symbols of (the children's) *acquisitiveness* (Easter: "eggs,"

"candy," "rabbits"; Christmas: "toys," "presents," "candy," "Hallowe'en," "birthday:). Christmas was also thought of as a *season* ("trees," "snow," "winter"). Christmas and Easter are cultural, not universal symbols; in American culture, the material side of Christmas is emphasized, and young children in particular are conscious of getting presents.

Among the family and school symbols, the symbol stimulus "Father is *patriarchal* ("grandpa," "brother-in-law," "gorilla," "son," "God"), and is a symbol of *power* ("God," "gorilla"). He is half of the sexual *union* with "mother." "Gorilla" was an original symbolic equivalence, since it animalizes a human, and depicts strength, fearlessness and dominance over others. Mother is the other half of the *union* with "father," is the *matriarchal* symbol ("grandmother," "daughter," "dresses"), a *life source* ("food," "money," "work") as well as a *nurturant feeder* ("food," "cooking"). Teacher, as a symbol stimulus, yielded more associations than equivalences. Teacher is a *caretaker* ("mother") and a *transmitter of knowledge* ("adding machine," "school," "work," "learning," "arithmetic").

As pedagogical devices, these exercises were designed to encourage metaphorical thinking and to introduce the problem-solving strategy of making the familiar strange, or finding something strange about the familiar. Essentially, we were encouraging intellectual factors of the Guilford sort (such as Gestalt Transformation) as well as the Koestler sort (bisociation, remote association). In subsequent sessions we employed various of the Guilford tests as games (Alternate Uses and Consequences, e.g.).

The test results in second grade did show increasing development on the Baron-Welsh Art Scale as compared with the pre-schoolers. The Art Scale average score was 26.05 with a standard deviation of 7.68, a significant increase. Mean score on the Child Test, adjusted for number of slides,

was 13.88, not significantly different from the mean of 14.88 observed at the Child Art Center. The Art Scale results are consistent with other developmental norms to which we refer later: from grades one through eleven there is a consistent slight increase in scores from grade to grade.

Results with the M-threshold Inkblots are of special interest from the developmental point of view, and particularly so in light of the apparent hereditary factor in the human empathic response revealed in the twin study. The M-threshold slides were administered in the standard sequence and individual responses tabulated for each of twenty children. Adult norms would lead to an expectation of one M-response by the second blot, and ten M-responses by blot 13 in the 26-blot series. Actually, however, no M-response occurs in this sample until blot 8, and then only in 1 of 20 children (where 28% occur in adult groups). By blot 13 we have 2 of 20 M-responses, or 10% as compared with the adult expectation of 48%. Even at blot 23, with an expected adult frequency of 92%, nearly half the responses were interpretations of the blot as animals, insects, trees, or various inanimate forms.

This finding certainly calls for further study, since, in conjunction with its possible heritability, a biological basis for the function considered by Rorschach to be central to creativity is suggested.

Once again, teacher ratings proved to be unrelated to test measures, as Table 5.2 shows. The creativity ratings do correlate with the Art Scale and unusual responses on the Symbol Equivalence Test at about the same level as in the adult San Francisco Art Institute sample (positive relationship between .25 and .30), but with the small N of 20 this correlation may well be due to chance.

3. Art in the Park

A report on this study was made in our progress report dated October 2, 1968 and we shall simply summarize the experience and the findings here. The program itself was sponsored by the Berkeley Community Center and was a summer program for some 150 children, ages 9 to 13. A variety of art classes were offered, including painting, drawing, sculpting, dance, improvisational drama, and light shows. The setting was mostly outdoors in a secluded park in Berkeley, though there was one building available and it was used occasionally for dance and light shows. An amphitheatre was part of the setting and the drama classes staged their work there.

Our main aim was to discover whether symbolic scope, as measured by the Symbol Equivalence method, would be increased by the experience. To this end, we administered two newly constructed children's forms of the test, more complex than the Vallecito form for 6 to 8 year olds, and containing figural as well as verbal items, at the beginning and just before the end of the program. The study was under the general direction of Jerrell Kraus, who devised the new children's form of the test and conducted all the testing.

Since these newly developed forms of the Symbolic Equivalence Test have not been described nor the norms published elsewhere, we shall include that information in our report at this point.

A total of 142 children were tested initially in the Arts in the Park program, and 64 of these were re-tested at the end. (The others had dropped out or could not be located for testing.) The children were asked to respond to 34 stimulus images, including 24 phrases and 10 drawings. (The drawings are reproduced later when responses to that part of the test are described.)

The individual stimulus images are more difficult to analyze as symbols

than were those in the Vallecito study, since they are phrases (not single words) containing compound properties. The children were asked to write down what each phrase or picture made them think of or feel like. The images are of two kinds: active (e.g., popcorn popping) or static (e.g., shiny silver pebbles). With these complex images, it is most important to pick out the properties or characteristics of the symbol that induce the responses.

With that in mind, let us consider the verbally presented images one at a time. *White bird flying over the sea* is an image that children discerned as a *solitary object* ("handkerchief," "spark," "feather," "flash," "cloud," "sailboat," "airplane," "superman," "seagull," "dove") *moving* ("blowing," "moving," "floating") over or through a *massive expansive space* ("in wind," "across the sky," "over the sea"). Some children gave the symbolic equivalences "loneliness," "freedom," "beauty," and "peacefulness."

Hearts pounding symbolizes *life function* ("health," "life," "blood poisoning," "earache"), and partly because of the eventual wearing away due to the *repetitive banging sound* ("thumping," "drums," "hammer banging"), *inevitable death* ("death," "spooky").

Bubbles floating in the wind evoked images using *movement in air* ("snow falling," "signal from a prisoner," "birds gliding," "flying saucers"), *separation from a source* ("feather," "flying saucers," "space ships"), *weightlessness* ("feather," "champagne bubbles") and *round shape* ("balls," "eggs," "planets"). Two responses indicate an interpretation of *freedom-seeking* ("I can do anything I want," "signal from a prisoner"). The most creative symbolic equivalence was "signal from a prisoner," since it not only implied the purpose or motive behind the action, but it also indicated who the motivator behind the action was.

The children's responses to *popcorn popping* spelled out several characteristics. *Popcorn popping* incorporated upward movement ("volcano," "people jumping," "grasshoppers hopping," "jumping beans," "fireworks," "things jumping"), sudden violent movement ("volcano," "fireworks"), heat ("volcano," "fireworks"), spilling from a container ("volcano," "pods popping"), sound ("Morse code," "pods popping," "buds bursting," "fireworks," "beating noise"), as well as expansion of a compressed object ("pods popping," "fireworks," "buds bursting"). "Morse code" is an original equivalence that is an example of a fanciful, playful association. It depicts the scattered rhythmic sound of one object hitting another.

Dark shadows moving around symbolizes, to these children, fear of the unknown ("black ghost," "spook," "monster," "psycho," "somebody's watching me"), or possibly, fear of the unconscious.

Laughing ladies symbolizes the sound of verbal picking apart ("gossip," "chickens"), a mixture of positive emotions ("happiness," "love") and fearful emotions ("creeps," "witches," "crazy ladies," "nuts"), implying that laughter may, on the surface, be pleasant, but is often a disguise for something frightening, perhaps evil, even for insanity.

Echoes in a dark cave yielded very few responses. The properties of sound ("crowd of people," "yelling in your ear"), and the feeling of isolation ("lost man," "being alone") were given.

Bird flying up and up is primarily characterized by the quality of unbound freedom ("free bird," "liberty," "free enjoyment").

The characteristics of *Red oozing* contained in the children's responses were its color ("red paint," "blood"), its wetness ("red paint," "blood," "cut"), its warmth ("blood," "warm") and its source ("upside down can of paint," "blood," "cut").

Flower buds bursting has a positive connotation ("pretty," "beauty," "happiness") of birth ("new life," "spring," "eggs hatching"), motion from closed to open ("bombs exploding," "explosion," "eggs hatching") and metamorphosis ("balloons popping," "bombs exploding," "new life," "spring," "eggs hatching").

Sand sifting through hands yielded few responses, but one characteristic was revealed--the movement of one particle through an object ("soaking up the sun," "gold through a rich man's hands").

Falling down a deep hole contains the properties of movement through air ("flying," "dropping in space"), gravitational pull ("dropping in space," "diving in water," "bear falling down trap") and encapsulation ("captured," "bear falling down a trap"). Two of the responses indicated that the image symbolized death and possibly even the descent to hell ("repent," "dead").

The responses to *shiny silver pebbles* characterized value ("cool magic charms," "sparkling diamonds," "lots of nickels," "sterling silver shining in the distance"), and round-like shape ("lake with rocks on the bottom," "buttons," "nickels," "gold").

The responses to *two eyes staring* concentrated on shape ("sun and moon," "cats eyes"), duality ("sun and moon," "cats eyes"), and the fixating of visual attention ("lovers," "hypnotist," "curiosity," "cat's eyes staring from a dark corner"). "The sun and moon" is an original response, lending a cosmic sense to *two eyes staring*, as if the two eyes were the all-knowing vigilant gaze of bodies from the universe upon the earth.

Lots of hands clapping yielded responses focusing on the repetitive sound ("drums playing far away," "rain on the roof," "heartbeats") of the motion of one object hitting another ("drums," "rain on the roof," "heartbeats"), and approval ("earthly praise").

Caught in a web contains the characteristics of entanglement ("tied

up") in a *matrix* ("knitting").

Rain on the roof has a variety of properties revealed by the children's responses. There is *sound* ("rocks hitting the roof," "pitter patter," "dripping drops," "loud," "sticks clattering together," "heartbeat," "drum rhythm," "feet running," "birds running"), of *motion* ("rocks hitting the roof," "bombs over the country," "rain on the doghouse," "dripping drops," "falling rocks," "drum rhythm"), of *one object hitting another* ("rocks hitting roof," "bombs over country," "rain on doghouse," "sticks clattering together"), in a *downward direction* ("sunshine," "rocks hitting roof," "bombs over country," "rain on doghouse," "dripping drops," "falling rocks," "drum rhythm"). Two final properties of the stimulus image are sense of *touch* ("wet water," "wet," "cold"), and *shape* ("drops," "bombs," "dripping drops," "rocks").

Deep water implies *quantity* ("big glass of water," "sea," "deep swimming pool," "ocean," "deep pond," "puddle") or *boundaries* (deep swimming pool, "big glass of water," "sea," "ocean," "deep pond," "puddle," "tunnel"). A few responses indicate reference to the following properties: *death* ("drowning," "dead"), amount of *light* (dark, "shadows") and *distance* ("quicksand," "tunnel"). Both "death" and "quicksand" are creative symbolic equivalences; "death" refers to the netherworld aspect of *deep water* while "quicksand" suggests a perfect analogy to depth, sinking in, and drowning.

The responses to *floating feather* yield rather vague properties--that of *motion in air* ("flying," "glider," "soft slow air," "parachute," "snowflakes," "kite"), *smoothness of motion* ("light," "graceful," "swift," "swoop") and the *light weight of the object* performing the motion ("leaf," "bird," "bug," "seagull," "kite," "parachute").

Full moon yielded some of the same properties as *moon* in the Vallecito study: *shape* ("circle," "sun," "egg," "ball"), *celestiality* ("stars," "sun"), *luminescence* ("stars," "sun," "bright," "bright light"), and *color*

("egg," "large gold ball"). In addition, *full moon* evoked responses referring to the *amount of light* ("clear night," "night," "dark"), and is associated with *fear* ("mysteries," "wolfman prowling," "Hallowe'en").

The rising sun shows some properties similar to *sun* in the Vallecito study. It implies *luminescence* ("light," "rising moon," "sunset," "spark," "morning," "fire," "dawn," "day"), *heat* ("hot," "fire," "steam," "warmth"), *color* ("orange color," "rainbow," "golden," "colors"), and *shape* (ball, "ball of cotton"), as does *sun*. Also, *rising sun* yielded responses referring to *cycle movement* ("dawn," "morning," "day," "sunset") and *aesthetic quality* ("beauty," "glory," "pretty," "nice-looking").

Bells ringing implies a *communal calling* ("church," "wedding," "school bells"), sometimes as a *warning of danger* ("honking horns," "burgler alarm," "fire engine") or a *celebration* ("Christmas," "Christman carols," "wedding"), characterized by *repetitive sound of one object striking another* ("honking horns," "doorbell," "burglar alarm," "hammer hitting mail," "tower clock," "metal clanking"), and *alliteration* ("dong ding dong," "chiming," "gong," "plink").

Empty space characterizes the *void* ("black paper over eyes," "infinity," "nothing," "outerspace," "sky," "blank") to most of the children, and something *finite and confined* ("room," "bag," "balloon," "playground," "box," "abandoned house") to some. In two responses, *empty space* was equated with *loneliness* ("lonely," "left out").

Blazing fires involves *motion* ("house burning down," "waterfall," "crackling"), *heat* ("sun," "hot," "forest fires," "oven"), *light* ("sun," "bright," "light show"), *color* ("yellow," "blue," "red"), and *sound* ("sound of laughter," "crackling").

The ten drawings in the Art in the Park study (see next page) stimulated

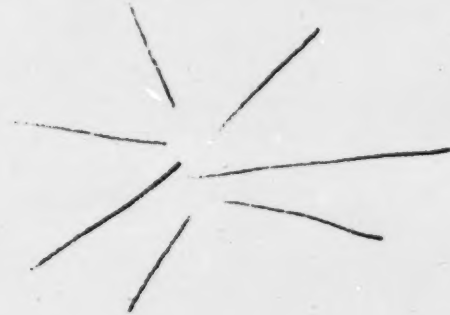
(1)



(7)



(3)



(1)



(11)



responses referring primarily to the shape of the objects drawn, although some of the more original symbolic equivalences projected sensory images of smell and touch.

Drawing #1 was viewed as either a *total object* ("electric eyes," "hairy eyes," "bloodshot eyes," "suns," "comets," "space creatures"), or *part of an object* ("head of an octopus"). It was seen as *alive* ("eyes," "sperms," "head of an octopus," "space creatures"), by some of the children. The radiating part of the drawing called up images of *heat* ("suns," "hot," "comets") and *sound* ("bells," "fire alarms going off"). The creative symbolic equivalences were the responses above that depicted action, such as "fire alarms going off."

Drawing #2 stimulated images of *smell* ("onion"), *heat* ("fire," "oven," "upside down heat," "warm," "hot") and the *line configuration* was emphasized in "onion," "shell," and "wig." The drawing was also referred to as a *natural element* ("fire," "air," "rain drops").

Drawing #3 evoked responses referring to its *shape* as *pointedness* ("teepee," "pyramid," "mountains"), as *outlines* or *covering* ("frames," "roof," "cave") or *part of the earth* ("cave," "mountains"). The most creative response referred to *sound*--"vibrations."

Drawing #4 had one creative response referring to *color* ("stained glass") and the remaining responses all referred to its *shape*. Some responses focused on the *whole* drawing ("gunsight," "wheel," "tire," "quartered pie") while others focused on the *intersecting cross* ("window," "target," "right on the dot," "fancy addition sign"). Still others focused on the *flatness* ("window," "target," "bulls-eye," "stained glass," "potholder"). Several of the responses depicted the drawing as an *object to be hit* ("target," "bulls-eye," "torpedo target," "dart game").

Motion is characteristic of many of the responses to *Drawing #5* ("topless dancer," "wind," "smoke," "cyclone," "tornado," "whirlpool," "dust blowing," "spin," "turn," "expand"), as well as *velocity*. Two original responses are worth noting: "expand," although not a true symbolic equivalence (since it is a verb, not a noun) implies infinite change in size and movement from smaller to larger, and "topless dancer," which anthropomorphizes the drawing.

Drawing #6 was, overall, interpreted as a *group of one type of object* ("crystals," "snowflakes," "diamonds," "thorns," "stars," "ants crawling," "birds feet," "bird tracks," "toothpicks," "bugs," "spilled pins"). There were some responses that judged the drawing to be a *single object* ("fireworks," "cloud," "cracked mud," "kaleidoscope," "game," "maze," "picture," "glob," "mosaic"). "Kaleidoscope" and "maze" are particularly creative responses because they pay attention to the mixed-up configuration of the drawing. The drawing is *alive* ("ants crawling," "birds feet," "bugs"), and there is *movement* in "fireworks," "sparkler," "kaleidoscope," "sparks," "ants crawling," "birds feet," "bugs"). The *parallel lines* are emphasized in "birds feet," while the *straightness* of the lines is emphasized in "crossword puzzle," "birds feet," "bird tracks," " " and "spilled pins."

Drawing #7 is viewed as *part of a whole* ("cells," "microbe," "piece of a jigsaw puzzle"), being *alive* ("cells," "microbe," "termites") or showing *motion* ("light show").

Drawing #8 is described as *radiating* and *moving outward* ("sparklers," "fireworks," "light exploding star," "sun"). It is viewed as a *single whole object* ("sparklers," "sun," "light exploding star") or as *particles* ("pick up sticks," "stick puzzle," "sticks"). A few original responses depict the

properties of the drawing's rays as *light-producing* ("sun," "light exploding star," "sparklers," "fireworks").

Drawing #9 contains the property of having a *twisted* or *contorted* shape or state ("spiral bone fracture," "headache," "upside down snail"), implying some irregularity or abnormality. The most creative responses viewed the drawing as the *action of unfolding* of either the mind or time ("dreaming," "time tunnel," "time," "thinking").

Drawing #10 received responses involving *active motion*, mostly ("shock," "lightning," "thunder," "roller coaster"), although there was one *touch* image ("shock") and one *sound* image ("thunder").

In comparing the Vallecito study results with those of the Art in the Park study, several similarities are noticeable. With the exception of the *sun* and *moon* stimuli in both studies, the stimuli themselves were dissimilar. Overall, the stimulus images in the Vallecito study yielded single word responses that were easier to evaluate than the more complex responses to the symbol stimulus phrases and drawings of the Art in the Park study. However, both studies had many responses referring to abstract qualities such as power, loneliness, beauty, purity, knowledge, death, freedom, approval, fear, warning and the void. By and large, the drawings in the Art in the Park study yielded concrete qualities, mainly referring to the shape or configuration of the drawings, although many of them had characteristics of sound, touch and smell attributed to them. The stimulus images in both studies were characterized as possessing either a certain shape, temperature, color, speed, quantity or size, type of movement, smell, or configuration in the universe.

The two groups were approximately equal in number and quality of original responses. Overall, the creative or original responses reflected an alternative, playful approach to the stimuli.

The child who creates new equivalences to a symbol allows all of his senses to participate in and influence his interpretation of a new experience, just as he uses the experience to shift and modify his conceptions of himself and of the world around him. Perhaps the results of these studies will help to stimulate further explorations and systematic observations of symbols and children's rich interpretations of them.

The scoring of full test protocols of individual respondents was done by two other research assistants (i.e., not Jerrell Kraus) who were kept in ignorance of whether a given set of responses was pre- or post-program. Scoring was in terms of: 1) quantity of acceptable responses 2) unusualness. No increase was observed in the quantity score, but a highly significant difference in the direction of increased unusualness of response occurred.

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VI. Prediction of Student Performance at the San Francisco Art Institute

A. Research Design and Methods

The basic design of the prediction study at the San Francisco Art Institute was as follows: 1) obtain portfolio of recent work from entering freshmen and rate them for artistic potential; 2) test entering freshmen with a battery of psychological tests, including performance measures as well as questionnaires; 3) correlate tests with portfolios; 4) correlate tests with grades at end of first year; 5) obtain new portfolios of work completed by end of first year and relate ratings of these first-year portfolios to test results; 6) continue to gather information such as grades and exhibits of work throughout the four-year course leading to the Bachelor of Fine Arts degree; 7) obtain final criterion information in the form of faculty ratings, peer ratings, grade-point average, honors, and scholarship support, and out of this construct a composite criterion for prediction. If possible, repeat the study on a second class.

The study has been completed more or less as planned, but quite a few unexpected events intervened to erode gradually these neat outlines. Factors affecting the study adversely have been these: 1) student hostility towards objective testing--in art students this is quite extreme; 2) faculty hostility towards the idea of rating artistic potential; 3) a formal faculty decision during/second year of study to change from the conventional letter-grade system of A to F to a Pass-Fail system; 4) a formal faculty decision to abandon the portfolio requirement and in fact not to have any criteria for admission except high school diploma; 5) an unexpectedly high dropout rate of 83% between admission and graduation (i.e., only 17% finished of those who started in 1968 and 1969); 6) student unrest attributable to the

war in Indochina and a general mood of protest which flared up at times into a general rejection of demands by anyone in authority.

Given these limitations, we nevertheless did succeed in carrying the study to completion, and we did test a second class, with a reduced battery of tests, to check out results from the first. The mitigating factors proved to be: 1) loyal support from the school administration, especially the director and dean of admissions; 2) abatement of hostilities in Indochina and gradual cooling of negative student attitudes; 3) excellent personal rapport between the students and the IPAR staff's research assistants and consultants, especially the interviewers; 4) wide dissemination of the book *Artists in the Making* among faculty and students, with consequent change of attitude and decided cooperation in making the final faculty and peer ratings.

The research involved many things besides prediction of student performance, of course, and much of the data have already been reported in full in *Artists in the Making* and in various published papers and progress reports. In particular, the book contains a full description of the test battery and gives basic statistics descriptive of the student samples and of interrelationships among variables. The initial interview study has also been reported there, and appended to the present report is an audiotape giving detailed further information on the conclusion of that work. Our concern in this final report is to give an overview of the prediction study, with most attention to correlations of the 1968 and 1969 test performances with the composite criterion of performance as measured by various outcomes in 1973.

The test battery, it will be recalled, included the following measures which were administered to 91 entering students in the Fall of 1968.

Adjective Self-Description
Artist Self-Rating on Creativity

Barron-Welsh Art Scale
 Barron M-Threshold Inkblots
 Child Esthetic Preference Test
 Consequences Test, Parts I and II
 Franck Drawing Completion Test
 Gottschaldt Figures Test
 Hardyck Stick Figures
 Mosaic Judgment Test
 Perceptual Acuity Test
 Strong Vocational Interest Blank
 Symbol Equivalence Test, Parts I and II

In addition, the Juhasz Sensory Reasoning Test was administered individually to 25 of these students in the summer of 1969.

B. The Entering Portfolio Study

Although all 91 entering students were required to submit portfolios, only 48 complied. (This large-scale ignoring of requests to submit work for comparative evaluation held true also when similar requests emanating from the Dean of Students office were made at year's end for both classes. Many students viewed it as an imposition when asked to bring in their work for evaluation, in some cases considering it immoral and in other cases just a demand too inconveniencing to be met.)

The 48 student portfolios at entrance were rated by eight senior faculty members of the Art Institute and by four IPAR staff members, including the principal investigator and the director of the testing project. Ratings were based on a 3-step classification in terms of "degree to which the student has potential for serious work in art." The eight Art Institute faculty members' ratings were then averaged and correlated with the averaged ratings of the four IPAR staff members; a correlation of .50 results. Further analysis by sex of students showed an interesting difference, however; the two Institute staffs correlate .67 with one another when males are rated, but only .01 when females are rated. The details of this finding are given in the table below.

Correlations of San Francisco Art Institute and IPAR Raters
on SFAI Student Portfolios

	<u>N</u>	<u>Male</u>	<u>N</u>	<u>Female</u>	<u>N</u>	<u>Total</u>
<i>Tested students in sample</i>	32	.666	16	.008	48	.499
<i>Tested students, including some not in sample</i>	33	.669	18	-.014	51	.496
<i>All students rated, includ- ing some not tested</i>	40	.611	22	.264	62	.501

Informal conversations between the principal investigator and the Art Institute faculty raters explored attitudes towards male vs. female students on the part of the faculty, which as it happens is all male. These conversations left the principal investigator with a very strong impression that female art students are not taken very seriously by the faculty. Typical comments: "They may hang on and graduate but then all they ever do is teach school or get married and get a job in something else"; "They *never* have a one-man show--never, not one in the whole history of the school." Support for this view of sex differences in professional success so far as art is concerned may be found in interviews with the most promising of the female students, as reported in Chapters 1, 2, and 3 in *Artists in the Making*.

Correlations of test results with the portfolio ratings revealed still other differences in what the raters seem to be responding to. These may be summarized as follows:

1. Portfolio ratings by the Art Institute faculty raters proved to be significantly correlated with a number of self-ratings and interest or attitude scales, but unrelated to all but one of the performance and esthetic judgment tests. The single exception in the performance domain is the Human Movement tendency on the Inkblot Form Test (a positive correlation of .28). Other positive correlations are with the Barron Complexity scale and with the "Printer," "Policeman," and "Masculinity" scales of the Strong Vocational Interest Blank. A negative correlation on the latter test is for "President of Manufacturing Concern." Students who state that they "prefer to work on their own rather than in class" are more highly rated, as are those who say they "value a good instructor's opinion of [their] work more highly than their own."

2. The IPAR staff's ratings of portfolios produced an entirely different set of correlations, being positively associated with performance on the Perceptual Acuity Test and the Gottschaldt Figures and negatively with SVIB scales for "Personnel manager" and "Pharmacist."
3. As indicated earlier, there were sex differences observable in the ratings. The IPAR ratings of portfolios for the female student alone correlated quite highly with their scores on the Child Test of Esthetic Judgment. The SFAI faculty ratings for female students had a high negative correlation with the Barron-Welsh Art Scale.

C. The Degree as Criterion

One stated aim of the faculty and administration of the Art Institute at the beginning of the study was to find a way to select students who would work to completion of the degree. This is obviously not the only desirable outcome of the educational process, but it does represent a common-sense partial goal if the degree-offering is considered worthwhile by those who offer it.

As we have already stated, only 17% of the combined entering classes of 1968 and 1969 had earned the B.F.A. by 1973. Attrition in each class by the end of the second year was approximately 70%. Only in a very few cases, no more than half a dozen, was a leave applied for or granted. Nor had anyone who had applied for a leave by 1971 returned by 1973. Furthermore, only in two instances was a student on academic probation who failed to return. Non-graduation was accomplished by the vast majority of students simply by making a quiet disappearance. Often, however, the disappearance was only from studio and classroom and the registrar's files; many students continued to "be around," often continuing to work in art and to think of themselves as part of the school but not as a student.

There are two complementary ways of looking at the data to see what may be involved psychologically in getting a degree. One is to inspect the actual correlations between degree-getting and the entering scores on

test variables and self-ratings. The other is to look at differences in mean scores between the two groups, those who get the degree and those who do not. Significant mean score differences will be consistent with the correlational results, of course, but level of scores may add to the interpretation.

First, then, the correlates of degree-getting. Only a few variables prove statistically significant, although taken together they do suggest a meaningful pattern. At the .01 level of confidence, the Independence of Judgment scale and the Originality key of the Strong Vocational Interest Blank are negatively predictive, i.e., the more independent and the more original students have dropped out. The correlations in a sample of 167 are, respectively, $-.35$ and $-.32$. There is also a significant negative relationship with the self-rating for the phrase, "I work spontaneously rather than deliberately," ($-.22$). The only significant positive relationship is with the Gottschaldt Figures ($.22$). The overall picture suggests that staying power has some slight positive association with problem solving ability in the area of visual form discrimination, while independence and originality work in the reverse direction.

Level of elevation of these scales add a bit to the interpretation. Compared with the general population, the dropouts are extreme on the negatively correlated variables, i.e., they are almost too bohemian to be true. The degree-getters are also much more independent and original than the general population, but significantly less so than the dropouts. The findings are very similar to earlier results we obtained in the study of creative writers. Student writers occupy the extreme positions on scales that distinguish genuinely productive and distinguished writers from the general population; the latter fall in between. Too much independence and originality,

it seems, works against sustained effort in an institutional setting.

D. The Composite Criterion

This consists of information from several sources, combined so as to yield an overall score of 3, 2, or 1 for all students on whom there was enough information to arrive at such a judgment. It should be emphasized that for most students in the sample, information was quite fragmentary. Faculty ratings and peer ratings reveal this fact rather dramatically. By the late Spring of 1973, the average faculty rater knew only nine or ten students; and the average student rater knew only a few more of his peers than the faculty did. Fortunately, there was little overlap in who was known to whom, so that a composite picture could be constructed by allowing credit for being known *and* highly rated by only five or six raters. Nearly 60% of the entering students were not remembered by *anyone* in 1973--not by peers, nor by faculty, nor by the director, nor by the dean of admissions (who did, however, remember more students than anyone else did).

At first blush, this finding looked rather damning for the institution, but a little informal research at another college among faculty and students confirmed that most members of the graduating class did not know one another, did not remember dropouts from four or three years earlier, at least by name, and were not known at all by many faculty members. Perhaps this is simply the way things are in institutions of higher learning with enrollments in the hundreds. In any event, the composite criterion was finally arrived at, with other information contributing, such as scholarship support and awards and honors (scored *plus* of course). This final overall rating was then checked out with the Admissions office and cases on which there was any disagreement were scrutinized further. Use was made uniformly of the college transcript and faculty evaluations when they were available.

A correlational analysis reveals many significant correlations with the composite criterion, though none is as high as .50 and only a few are in the range .40 to .50. (We shall discuss below the development of regression equations based on the composite criterion.) First, however, let us look at the general pattern of positive and negative correlations.

The main positive correlations are with the Gottschaldt Figures (.27), the Consequences Test, especially Art II (.38), total scores on Part I of the Symbol Equivalence Test (.26), and the self-rating "I completely lose myself while working, forgetting all other personal matters" (.37). The self-rating "My work is unique" is also positive, though only .25. Finally, a variable from the Juhasz Test purporting to measure accuracy of taste discrimination correlates .42 with the composite criterion.

The main negative correlations are with scales of the Strong Vocational Interest Blank: Mathematician -.42, Engineer -.34, Physicist -.33, Physician -.33, Accountant -.31, Author-journalist -.32, all at the .01 level of confidence. Specialization level, which reflects professional orientation of the sort that requires advanced training, correlates -.36.

In the main, these correlations reflect a picture consistent with what one might expect of someone with the motivation and ability to be an artist. As we have emphasized, the composite criterion is distinct from the criterion of degree-getting, which in fact did not enter into it. One of the most highly rated students, e.g., is one who dropped out of the Art Institute at the end of the first semester.

A multiple regression equation was computed on the total sample, combining the entering classes of 1968 and 1969, for the SVIB and for the perceptual performance and judgment measures considered as a set. An 8-variable equation developed from the Strong yielded a multiple correlation

of .53 at the .006 level of confidence. Interestingly enough *Artist* receives a negative *beta* weight in the equation while *Production Manager* received the largest positive weight. Since, as we reported previously 95% of entering students score in the A range on *Artist*, and 90% in the C range on *Production Manager*, what the equation is telling us is that among those with high artistic interests a bit of the production manager in one's make-up is a distinct asset.

The variables entering into the multiple regression equation for the Strong Vocational Interest Blank are shown in Table VI.1 below, together with their *beta* coefficients. The constant for the equation is 4.88.

Table VI.1
Strong Vocational Interest Blank Scales
Comprising Multiple Regression Equation
to Predict Composite Criterion of Artistic
Potential for Students of the San Francisco Art Institute

<i>SVIB Scale</i>	<i>beta coefficient</i>
Artist	-.35
Production Manager	.35
Carpenter	-.25
Vocational Agricultural Teacher	.30
Public Administrator	-.39
Vocational Counselor	.64
Business Education Teacher	-.55
Pharmacist	-.34
Constant = 4.88	

When all the perceptual preference or performance measures were treated as a set of potential predictors and the same procedure followed for developing a multiple regression equation, the most efficient combination proved to be a subset of 10 variables yielding a multiple *r* of .41, significant at the .01 level. With this many variables in the equation, unit weights will produce substantially the same result as precise *beta* weights, but the latter are nevertheless given, together with the relevant variables

in Table VI.2 below. The constant in this case is 2.96.

Table VI.2
Perceptual Measures Predictive of
Composite Criterion

<i>Measure</i>	<i>beta coefficient</i>
Barron-Welsh Art Scale	.13
Gottschaldt Figures	.14
Mosaic Judgment: Merit	.13
Color	-.17
Form	-.18
Perceptual Acuity Test: non-illusion items	-.21
Inkblot Form Test: Part I - Volume	-.19
Part II - M	.12
Part II - Non-M	.18
Symbol Equivalence: Part II - Total	.16
Constant = 2.96	

E. The Abandoned Criterion: Grade-point Average

The picture we have just painted of our attempts to predict our composite criterion and also successful completion of the four-year course leading to the B.F.A. seems rather drab, although not wholly discouraging. In practical terms, we have learned that a simple one-hour test battery consisting of the Strong Vocational Interest Blank, the Barron Welsh Art Scale, and the Gottschaldt Figures give us about as efficient a set of predictors as we can find.

However, a much brighter picture had appeared earlier, before the Art Institute faculty and administration had decided to abandon the conventional grading system. The 1968 class received grades for three semesters, so a correlational analysis of all tests against the total Grade Point Average at the end of that period was carried out for the 62 remaining students. Much higher and quite sensible correlations with the criterion appeared in that analysis. They may be summarized as follows, breaking the predictors down into logical groupings. In what follows we treat only of correlations

significant at the .01 level of confidence.

1. Self-ratings

The highest correlations in self-ratings are:

When compared to the work of other students at my level, my work is unusually creative	.62
I work spontaneously rather than deliberately.	.60
I have definite feelings about most art work I see.	.58
I like my own work.	.57

2. Performance tests

Symbol Equivalence, Part II (total)	.61
Consequences I (total)	.47
Inkblot Form Test, Part I: M-volume	.44
Part II: M total	.51

3. Personal outlook

Adjective Self-description: Artist scale	.49
Complexity of outlook	.48

4. Strong Vocational Interest Blank Scales

<i>Positive</i>		<i>Negative</i>	
Osteopath	.42	Psychiatrist	-.47
Veterinarian	.49	Production Manager	-.48
Mathematician	.44	Farmer	-.49
School Superintendent	.38	Aviator	-.51
Senior C.P.A.	.60	Interest Maturity	-.40
Purchasing Agent	.39	Occupational Level	-.42

With the possible exception of the vocational interest scales, these correlations make eminent good sense and are highly promising so far as prediction is concerned. However, since the institution itself no longer wishes to make use of grading, and since in fact the faculty also does not undertake to write individual evaluation of students, we must consider the prediction of individual differences in course performance an aborted effort. Needless to say, however, it definitely contributes to our final set of recommendations.

VII. Recommendations

From our general experience as well as specific results in this research program, we feel able to make several recommendations in the areas of pedagogy, student selection, student and program evaluation, and future research on theoretical issues.

1. Pedagogy

Educational efforts should be directed to devising instructional programs specifically for improvement in measurable functions found to be related to creativity and effective performance in aesthetic endeavors. These include most prominently the cultivation of flexibility, complexity of perception, human empathy, aesthetic judgment, metaphorical thinking, symbolic scope, and originality. The very tests that we have used to measure these functions may be used as models for the development of exercises to enhance the abilities themselves.

Further, we think it useful with students of the arts to awaken awareness in them of their own characteristic modes of expression by having samples of their work described objectively to them in terms of the variables we developed for rating works of art. We refer here to dimensions such as complexity-simplicity, symmetry-asymmetry, expansion-constriction, hedonic tone, configurational and chromatic dynamism, role of geometry, abstraction, and representation in their expression, and the like. This should be done systematically at intervals during the regular academic course, whether by teachers or outside observers.

2. Student Selection

For selection of art students specifically we recommend the use of a small battery of tests that can be administered in a group setting and

scored objectively and without specially trained or skilled personnel. In addition to the Gottschaldt Figures, the Barron-Welsh Art Scale, and the Strong Vocational Interest Blank, we would suggest the Barron Inventory of Personal Philosophy (which contains the scales measuring Independence of Judgment, Complexity of Outlook, and Originality), Part II of the Inkblot Form Test, the Consequences Test, and the Symbol Equivalence Test (all of which were developed in this project), and, finally, the Artist Self-rating scales we employed (which were developed by an Educational Testing Service team for a study at the Rhode Island School of Design).

3. Student and Program Evaluation

First of all, we recommend the use of a definite grading system that will accommodate a wide range of judgment of performance in all subjects. This is not simply for the convenience of administrators or researchers; we believe from our general experience and from our evaluation research both at the San Francisco Art Institute and at College V, University of California at Santa Cruz, that it is extremely valuable to students to receive information about their comparative performance. It is also valuable information for evaluation of the educational program itself.

We recommend also that both students and programs be evaluated through application of the same tests we have recommended for selection. This may be done by repeated testing at appropriate intervals. The course of learning for individual students may thus be followed, and also the program as a whole may be evaluated for its effect on the functions measured.

4. Future Research on Theoretical Issues

We recommend extensive cross-cultural application of several of the measures found useful in these studies, with special attention to the cross-cultural comparison of developmental norms and sex differences. Some efforts

have already been made in this direction, particularly with the Gottschaldt Figures, the Child Esthetic Preference Test, the Barron-Welsh Art Scale, and the Perceptual Acuity Test. Many of the tests were of course employed in our twin studies in Italy, but what we are recommending here is systematic measurement in a wide variety of cultures and in a wide age range.

The twin method should be developed further by refining the measurement of environmental and educational influences. Our establishment of a substantial genetic basis for artistic aptitudes should be followed by educational experiments in which one member of an identical twin pair is given special training of the sort described in our pedagogical recommendations, so that a precise measure of educability might be obtained by comparing later performance of the experimental twin with the cotwin control. This should be done with twins in a wide age range, so that something might be learned about proper timing of educational experiences for maximum effect.

Finally, we recommend more detailed longitudinal study of individual artists of high ability. We have deliberately adopted a measurement approach primarily in the present research, but we believe that it can be combined with a personological approach through study of the entire life-span of creative, artistic individuals. The motivation to create is of central importance, and it can best be understood by understanding its workings in the lives of individuals.